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The Marine Observer

A quarterly journal of Maritime Meteorology

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THE MARINE OBSERVER

A Quarterly Journal of Maritime Meteorology
prepared by the Marine Division of the
Meteorological Office

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VOL. 58 **No. 299** **JANUARY 1988**

CONTENTS

	Page
Editorial	4
The Marine Observers' Log — January, February, March	8
Weather Influences on Battles and Invasions. By Lt Cmdr S.J. Auty	29
The computerized index of Observing Officers' records. By B.S. Fullagar	30
Port Meteorological Officers' Conference	33
Presentation of Barograph	34
Aurora Notes January to March. By R.J. Livesey	35
From *The Marine Observer* 40 years ago	38
Personalities	39
Book Reviews	
Deep-sea Challenge	41
The Royal Navy and the Falklands War	42
Notices to Marine Observers	43
Fleet Lists	45

COVER PHOTOGRAPH by Captain D.G. Kain shows ice accretion on m.v. *Shell Explorer* on 14 January 1987, after arrival in Jersey, Channel Islands (see page 13).

Letters to the Editor, and books for review, should be sent to the Editor, The Marine Observer, Meteorological Office, Eastern Road, Bracknell, Berkshire RG12 2UR

LONDON: HER MAJESTY'S STATIONERY OFFICE

Editorial

The Director-General of the Meteorological Office, Dr J.T. Houghton, CBE, FRS, D PHIL, presented a masterly paper in the April 1987 issue of *Meteorological Magazine* entitled 'The Meteorological Office — a ten-year perspective'. It is too long to reproduce in its entirety, but sections of it may be of interest to readers of *The Marine Observer.*

In summarising, the Director-General described the Meteorological Office's main responsibility as providing meteorological services (including weather forecasts and advice regarding weather and climate) to defence, civil aviation, shipping, other government departments, public bodies, the media, industry and commerce and the general public. It is widely perceived as one of the leading national meteorological services in the world, a position which results from the integrated nature of the Office's activity and remit (especially the integration between defence and civil activities), from the way in which the Office has concentrated its effort into key areas and from the quality of personnel the Office has been able to attract. This is an appropriate time to review the activities of the Office and to present the major components of its programme over the next ten years.

In the international sphere, close co-operation between national meteorological services must be maintained, as must the principle of free exchange of data and products between them.

Future developments in observations will be governed by the need to improve data quality and coverage, and the need to improve the cost effectiveness of data acquisition through a programme of automation. Of particular importance will be the improvement of space observing techniques both in improved hardware in space and also in better methods of data retrieval and interpretation.

A major equipment replacement programme is planned. Replacement of the central computer, the Cyber 205, will also be required before the end of the decade.

Expansion of the Office's repayment services is an important task during the next few years. Much of this expansion will occur through co-operative arrangements with other bodies, especially in industry and commerce.

The Office's programme of Research and Development will be strongly geared to the improvement of its operational products. Developments can also be expected in the way in which the human forecaster uses computer aids, the man-machine mix, in producing these products. Other important areas where the Office needs to pursue research to maintain expertise are those concerned with climate and atmospheric chemistry. Steps are being taken to enhance the co-operation between the Office and research groups elsewhere, particularly in the universities.

Under one of several sub-headings, 'Upper-air observations', the Director-General reports that plans are underway to deploy a more cost-effective and more automated system of upper-air observations. It is planned that this will be in place at all upper-air stations before 1990. Because of the high cost of dedicated weather-ships, the deployment of more cost-effective observing systems over the oceans is under consideration. Upper-air soundings from merchant ships are becoming possible through ASAP (Automated Shipboard Aerological Programme); free-floating buoys again deployed from merchant ships can provide basic surface observations, and automated observations from

commercial aircraft are being generated through the ASDAR (Aircraft to Satellite Data Relay) programme. For all these systems, data are relayed from the observing device in the ship, buoy or aircraft via a satellite link to an appropriate connection to the meteorological network. In setting up all of these programmes, the United Kingdom has played a leading role and is planning to contribute to them as resources become available through the winding down of the weather ship operation.

Referring to satellite observations and their uses, Dr Houghton explains that plans for the deployment of operational satellite systems during the next ten years are largely in place (satellite plans need to be made a long time ahead). So far as the United Kingdom is concerned the plans assume a continued contribution to operational Meteosat through the European consortium EUMETSAT, and the continued provision of instrumentation for the TIROS-N polar-orbiting series of the USA. The new TIROS-N instrumentation, which the Office is developing in co-opertion with industry, the universities and the Rutherford Appleton Laboratory (RAL), is part of the Advanced Microwave Sounding Unit which will be incorporated into the TIROS-N payload around 1990. Significant improvement in the accuracy of satellite soundings of atmospheric temperature will result from this instrument.

For the European Remote Sensing Satellite ERS-1, the Office is assisting in small ways with the Along Track Scanning Radiometer (ATSR) — an instrument for accurate sea surface temperature measurement being built by RAL — and is also planning to assist with data analysis and interpretation from the wind scatterometer on ERS-1.

Constantly in view is the question as to how far satellite observations can replace conventional ones. So far, observations from space have largely complemented conventional data by enabling coverage in both space and time to be realized, although they lack the detail required particularly in the lower atmosphere for some purposes. Further, so far it has been necessary to employ conventional observations to calibrate those made from space. As forecasting models become more sophisticated and more detailed, the requirements for data at a higher spatial and temporal density, with better coverage and higher accuracy, will continue to become more severe. It will continue, therefore, to be necessary to exploit to the full both conventional and satellite techniques.

On the subject of forecasting, Dr Houghton records that this skill has shown a steady improvement over the last 25 years. During the last 5 years or so the accuracy of forecasts up to 5 days ahead has been such that the public and the specialized Meteorological Office customers put much greater reliance than hitherto on the forecasts as a guide to their activities.

This gain in performance has been achieved by progressive improvements in:

(a) the quality and coverage of weather observations, and the way in which observations are incorporated into the numerical models,

(b) the numerical methods employed in the models and the computing power available, and

(c) the parametrization of physical processes included in the forecasting models.

No improvement on its own can be singled out as the main reason for greater forecasting skill. Many relatively small improvements have all played their part. From the point of view of meteorology as an applied science, it is most

encouraging that the consistent inclusion of better physics and mathematics is leading to better forecasts. Although, because of the basically unpredictable nature of some atmospheric processes, there clearly are limits to what will eventually be attainable in forecasting skill and forecast range, we are a long way yet from reaching those limits. For these reasons, continued improvements in the three areas mentioned above will form a significant part of the R and D effort of the Office over the next ten years.

Under the heading of 'The free public service', the Director-General finds a basic dilemma in the requirement on the one hand to provide the best possible service to the general public through the media and other public information channels, and on the other hand to meet a significant part of the Office's costs through selling services on repayment. The better the Office does the former, the harder it is to do the latter. A balance therefore has to be drawn. Because of the continuously changing nature of the content and quality of the Office's products and of the requirements of customers, a continuous appraisal of this balance needs to be made. Being aware of what services are possible, the Office needs to be sensible to the needs and desires of the public at large while also having an eye for commercial areas where substantial returns to the Office (and therefore to the taxpayer) might be achieved.

Apart from special requirements in emergency situations, the policy is to continue to restrict the provision of individual forecasts but to concentrate efforts on the dissemination of forecast information through the press, radio, television, videotext, recorded telephone services and the like.

Reasons are then given for the Meteorological Office's research programme:

(a) to provide support for, and the basis for improvement of, the operational services provided by the Office, and

(b) to provide a basis for continuing expertise in the areas of the field where the Office is required to provide expert advice.

About three-quarters of the total Research and Development effort and resources are directed towards improvements in forecasting and operational services.

Because knowledge of the state of the ocean is probably as important as knowledge of the state of the atmosphere for climate beyond a few months ahead, a high priority over the next decade will be the development of ocean models coupled to the atmospheric models. The topic of ocean modelling is in its infancy and is likely to develop rapidly. The Office has taken the initiative in setting up a small ocean modelling unit, which the Natural Environment Research Council is also supporting, in the Hooke Institute for Atmospheric Research at Oxford. Although only small in size it is among the foremost groups in the subject in the world at the present time.

In considering the resources required for the Meteorological Office to maintain its leading position, improve and expand its services and increase its commercial activity and return, the Director-General points out that the Office personnel complement fell from about 3650 in 1974 to 3200 in 1979 and was further reduced to 2700 in 1984 — a drop of 26% during the ten-year period. The introduction of automation in communications and data handling, together with contracting out, has made most of this reduction possible during a period when the range and quantity of services provided by the Office has shown a substantial increase as has its income from repayment services. A further 7% reduction to about 2400 net of secondments and loans is planned by 1988.*

In conclusion, Dr Houghton remarked that he believes that the next ten years will be both exciting and rewarding for the Meteorological Office as developments in both science and technology enable us to improve the quality, the effectiveness and the range of the services we are able to offer to our varied customers.

With insufficient space available in *The Marine Observer* to reproduce the whole of the ten-year perspective, we hope that these extracts will be of interest to readers. They demonstrate the vital contribution that is provided by those on board ships co-operating in the Voluntary Observing Fleet, as well as by the meteorological and shipping company personnel who so frequently and so selflessly give their valuable support, both at home and overseas.

To all our friends and colleagues, afloat and ashore, we send good wishes for safe sailing and success in 1988.

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* The number of staff on the strength of the Meteorological Office as at 31 December 1986 was 2546. Of these only a little over 1000 were based at Bracknell Headquarters, the remainder being distributed around various stations and offices in the United Kingdom, numbering more than 100, and about 12 stations overseas

January, February, March

The Marine Observers' Log is a quarterly selection of observations of interest and value. The observations are derived from the logbooks of marine observers and from individual manuscripts. Responsibility for each observation rests with the contributor.

Observing officers are reminded that preserved samples of discoloured water, luminescent water, etc. considerably enhance the value of such an observation. Port Meteorological Officers in the U.K. will supply instructions on how to preserve and pack such samples on request.

PASSAGE OF DEPRESSION

Western Approaches

m.v. *Matco Avon*. Captain M. E. Newall. Tranmere to Celtic Sea. Observers: the Master, Mr K. Gill, Chief Officer, Mr J. M. Evans, 2nd Officer, Mr D. Goulding, 3rd Officer and ship's company.

26–28 March 1987. Between these dates the vessel experienced the effects of an intense depression. The following account has been compiled from both the deck and met. logbooks, all times are GMT.

At midday on the 26th, the area forecast for the ship's position read, 'Fastnet, SW'ly, force 6, increasing 9, and perhaps storm 10 later.' With the forecast in mind, the vessel was prepared for heavy weather developing late on the 26th or early 27th, although things became a little more violent than expected ...

26th 1200:	Vessel slow steaming to maintain steerageway. Wind SSW'ly, force 6, pressure 1004.7 mb, falling slowly. Overcast, nimbostratus giving periods of moderate rain throughout the morning. Sea 1.5 m, swell 250°, height 3 m.
1600:	Wind SSW'ly, steady, but increased to a good force 7. Pressure 996.8 mb, falling more rapidly. Weather generally unchanged. Dry bulb 10.0 °C. Sea 2 m, swell 270°, 3 m.
2000:	Vessel hove to. Engine output increased to maintain steerageway. Wind now veered to SW'ly, increasing to force 8–9, with gusts to 55 knots. Pressure 989.5 mb, falling steadily. Squally rain showers. Sea 3 m, swell 270°, 6 m.
27th 0000:	Sea conditions deteriorating quickly throughout the preceding four hours. Vessel pitching violently in the surprisingly short sea and swell. Engine output increased frequently to find a happy medium between maintaining steerageway and restraining the vessel from pounding too heavily. Wind SW'ly, a steady force 10, with gusts to

Opposite page 8

Altocumulus lenticularis over Cape Town, photographed from R.M.S. *St Helena* (see page 9).

Photo. by J. Barkess

Nacreous clouds photographed from f.p.v. *Jura* (see page 26).

Opposite page 9

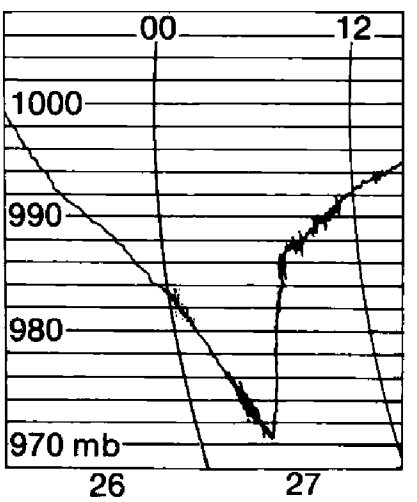
Photo. by S.R. Pridmore

Gallinule pictured on board m.v. *ACT 7* (see page 22).

Captain F.R.N. Best (*right*) receives his inscribed barograph from Captain G.V. Mackie, Marine Superintendent, at Bracknell on 12 August 1987 (see page 34).

65 knots. Pressure 984.0 mb, falling. Rain becoming more continuous and heavy. Dry bulb, 11.5. Sea state difficult to estimate, but seas becoming increasingly heavy, combining a mounting south-westerly swell and wind waves. Visibility severely reduced by spray.

0400: Pounding affecting the vessel severely, due mainly to the short period of the swell, rather than the sheer size of it (although the size was not helping matters very much). The blurred sections of the barograph trace give an indication of the violent manner in which the vessel was being treated. Wind, SW'ly, storm force 11–12, gusting



frequently to 70–80 knots. Pressure 976.1 mb, still falling rapidly. Rain, heavy at times. Sea state difficult to estimate, but increasing alarmingly. Visibility reduced by spray. Dawn at about 0600 allowed a full appraisal to be made of the sea state, at its peak from the south-west, height 15 m, with a short period of 7 seconds.

1200: Wind veered to W'N'ly, steady at force 11, gusting to 80 knots at times. Pressure starting to rise more rapidly than it had fallen, having reached a minimum of 970.6 mb at 0445. Heavy rain showers, becoming less frequent.

28th 0000: Wind now veered to NW'ly, force 9. Pressure 1001.7 mb, still rising steadily. Rain showers. Dry bulb 8.0, falling. Seas from the south-west, 10 m.

Position of ship at 1200 GMT on the 26th: 50° 18′N, 09° 06′W.
Position of ship at 0000 GMT on the 28th: 50° 00′N, 10° 24′W.

CLOUDS

South African Waters

R.M.S. *St Helena*. Captain R.H. Wyatt. Alongside, Cape Town. Observers: Mr D.A. Wheal, Chief Officer, Mr S.B. Quinn, 2nd officer and Mr R.I.J. Young, 3rd Officer.

11 February 1987. At 1630 GMT an unusual cloud formation was seen building over Lions Head. It was thought that this phenomenon was called a 'chaotic sky', and could have been caused by a combination of almond-shaped altocumulus and lenticular cloud forming over Table Mountain.

A photograph (opposite page 8) was taken, and shows the cloud forming over Lions Head, with Table Mountain to the left, and Signal Hill to the right.

Position of ship: 33° 56′S, 18° 26′E.

Note. Mr R.D. Whyman, of the Marine Climatology branch, Met. Office, comments:

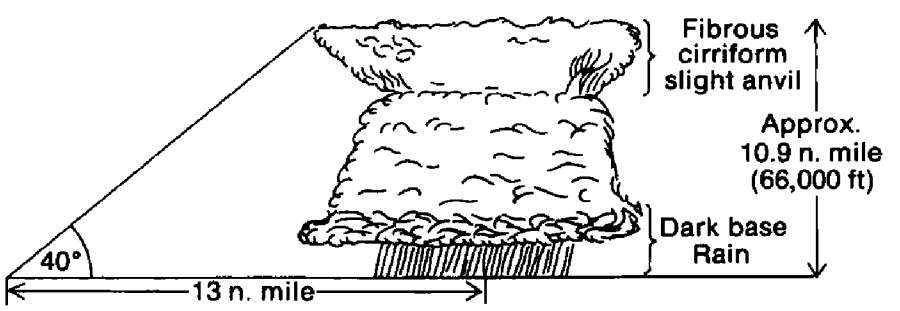
'An excellent photograph. However, this example would not be termed 'chaotic sky'. In the Met. office publication *Cloud Types for Observers*, this sky is characterised by "its heavy, stagnant appearance. There are more or less broken cloud sheets of poorly defined clouds of all transitional forms from rather low, thick altocumulus, to high, thin altostratus."

'It is generally agreed here, the picture having been studied by several individuals, that these clouds were, as suggested by the observers, lenticular altocumulus, but were not constituents of a chaotic sky in this case.'

South Pacific Ocean

m.v. *Willowbank.* Captain P.J. Elder. Long Beach to Wellington. Observer: Mr A. MacKenzie, Chief Officer.

5 March 1987. At 1800 GMT, a massive cumulonimbus cloud was noted and subsequently measured. It was mushroom-like in appearance, with a large vertical extent. Radar range, when combined with a vertical sextant angle, indicated the approximate heights given in the sketch.



Weather conditions at the time were: air temperature 27.6 °C, wet bulb 25.6, sea 29.0, pressure 1011.9 mb, wind variable, force 2.

Position of ship: 07° 60'S, 163° 06'W.

Note 1. Mr R.D. Whyman comments:

'Unfortunately, there are no upper-air ascents available with which to analyse the prevailing atmospheric conditions, and there is also a lack of observations in the area. However, cumulonimbus clouds of > 60,000 feet are possible in the tropics.'

Note 2. This is the tallest cloud to be reported in a VOF ship's met. logbook for some time. More observations and measurements of large cumulonimbus examples would be welcome.

TIDE RIP

Strait of Gibraltar

m.v. *Liverpool Bay.* Captain R. Dinnie, R.D. Southampton to Port Said. Observers: the Master, Mr R.J. Curry, 3rd officer, Mr A. Flynn, SM1 and Mr S. Thompson, SM1.

28 January 1987. At 1100 GMT an area of disturbed water was sighted ahead of the vessel. Further observation showed that the broken water consisted of numerous moderate/large waves which were about 4–5 m in height, tending to be

very confused. These waves were in complete contrast to the slight sea through which the vessel had previously been steaming. The area of disturbed water appeared to stretch from the coast of Morocco to about half-way across the strait, where there was a definite edge to the broken water or rip; the sea beyond it was of a similar state to that through which the ship was already passing.

At 1120, when some 7 n.mile due east of Punta Cires, the ship entered the disturbed sea, and once in it, the sea state gave the appearance of that produced by a gale of force 7–8, although the wind speed was actually SE'ly, force 4. The vessel was caused to lurch quite heavily, and extra helm was needed to maintain course. It took six minutes to pass through the rip, which was estimated to be about 1.8 n.mile wide.

It was thought that the rip was caused by the west-going tide moving against the prevailing current, which was easterly at that point. High water at Gibraltar was at 1328.

Position of ship: 35° 55′N, 05° 38′W.

Note. Mr J.B. Clark, of the Ocean Current section, Meteorological Office, comments:

'This phenomenon seems to have been caused by an influx of relatively fresh surface water from the Atlantic Ocean, aided by a rising tide and the south-going Portugal Current, being opposed by the wind.

'The Mediterranean is more saline and therefore more dense than the surface Atlantic water at this latitude. The result is that a circulation develops in a vertical plane, whereby Mediterranean water flows out of the Strait of Gibraltar as a subsurface current, to be replaced by the fresher, Atlantic water at the surface, which manifests itself as an east-going current.

'Under these circumstances, an opposing wind could favour the formation of moderate or large waves. A similar state of affairs exists at the other end of the Mediterranean, where relatively fresh water enters at the surface from the Black Sea via the Bosporous, the Sea of Marmara and the Dardenelles, and a weak subsurface counter-current carries the more saline, denser water in the opposite direction.'

UPWELLING

Eastern South Atlantic

m.v. *Rainbow Avenue*. Captain C.A.M. Tatham. Singapore to Pointe Noire. Observers: Mr J.D. Mackenzie, 2nd Officer, Mr C.R. Booker, 3rd Officer, Mr D.A. Pugh, Radio Officer Mr B. Sesay, Lookout, and members of ship's company.

29–30 January 1987. At 0830 GMT on the 29th the vessel passed a line of rough water lying 190°/010°, and two different sea states became evident. One body of water, which was choppy, was presumably running against the wind (SSE'ly, force 4), whereas the other one was running with the wind, and was much smoother. It was assumed that this was the Benguela Current. Where the two bodies of water met, the sea state was confused, with numerous 'white horses'. On passing into the smoother, offshore water, the sea temperature was 1.5 °C cooler than the previous temperature of 19.0, taken fifteen minutes earlier. The depth of water was 160 m.

When the vessel was in the smoother water, strong, deep-red patches of water were observed, ranging in size up to 1 sq. km. Their colour was of a constant shade throughout, and had very clearly defined edges. These patches were

assumed to be evidence of upwelling, for which the Benguela Current is well known. There was also a strong smell similar to that of a rocky beach at low water.

Also observed during the period up to 1300 on the 29th were large plants floating on the surface, but not in the patches. They looked like small, yellow-brown palm trees, having smooth trunks and not so much foliage. One end seemed to have leaves similar to cabbage leaves although these were difficult to observe. The plants lay on the water horizontally, and looked like sea-bed plants which had been brought to the surface, maybe by upwelling. Many were seen during the morning, approximately one every four or five minutes.

Between 1800 on the 29th and 0500 on the 30th, bioluminescence in the form of a bright-green glow was observed in all disturbed water, namely the bow wave, down the ship's side, in the wake and any occasional 'white horses'. Due to the large amount of moisture in the air (there was heavy dew on the ship's superstructure), the visibility was only 10 n.mile, but the luminous properties of the sea at times severely reduced this, producing an effect similar to the back-scatter from navigation lights. In addition, just under the surface of the water, ten luminous streaks, like green comets were seen converging on the ship, but staying alongside just out of the broken water. These comet-like appearances were trying to keep up with the ship, and were, of course, a species of dolphin activating the bioluminescence and producing the effective after-glow over a distance of about 12 m. This particular event lasted only three minutes, but was most impressive to witness.

Position of ship at 0830 GMT on the 29th: 28°30′S, 15°15′E.

Position of ship at 0500 GMT on the 30th: 23°00′S, 13°00′E.

Note. Mr J.B. Clark comments:

'The fall in sea-surface temperature from 19.0 to 14.6 indeed resulted from fairly strong upwelling which brought microscopic and other life forms to the surface, as shown by the coloured water, odours, plants and bioluminescence observed.

'*Meteorology for Mariners* contains mean sea-surface temperature charts which show that the mean SST in this region in February is generally 18.0 to 19.0, falling sharply close inshore (upwelling) to 16.0, or even below.

'This particular upwelling event was, however, originally encountered some 40 n.mile offshore, and the line of disturbed water described seems to have marked a convergence line between the normal north-west going Benguela Current and the upwelled water, whose horizontal speed was less than that of the current.

'The further observations indicate that the upwelling was occurring at least as far north as latitude 16° S, where the normal February SST is about 21.0.'

SEA TEMPERATURE

Western North Atlantic

m.v. *Farland.* Captain M.B. Bradley. Immingham to Port Cartier. Observers: the Master and Mr D. Wallis, 2nd Officer.

16 January 1987. At 0600 GMT a sudden and unexpected rise in the sea temperature was noted, having risen from 4.3 °C to 12.7 in the six hours since the previous observation. A second water sample was taken, and the sea temperature was read using ERT and by bucket (using a different thermometer), in order to check that the readings were correct.

This sudden rise was also noted to coincide with a sharp rise in the vessel's speed, from 10 knots to 12.7 knots for a period of approximately forty minutes. Unfortunately, owing to the vessel's large freeboard, and relatively strong winds prevailing at the time, no current observations were taken due to the amount of leeway the vessel was making.

At the next observation, it was noted that the sea temperature had fallen to 4.0. It was assumed that these changes were due to a local current, probably initiating in the Gulf Stream.

Position of ship: 45° 18′N, 45° 18′W.

Note. Dr P.J. Herring of the Institute of Oceanographic Sciences, comments:

'This rapid change in sea temperature does indeed seem likely to have derived from a local current. Sometimes, the meanders of the Gulf Stream develop into separate 'Gulf Stream rings'. Those to the north of the Gulf Stream have entrained cores of warmer water, and it may well be that the vessel encountered one of these rings. They may persist for many months, and may be 100 km or more in diameter.'

ICE ACCRETION

English Channel

m.v. *Shell Explorer*. Captain D. G. Kain. Stanlow to Jersey. Observers: the Master, Mr J. M. G. Arthur, 1st Officer, Mr M. J. G. Garner, 2nd Officer and ship's company.

12–13 January 1987. At 0700 GMT, upon being called to the bridge, the Master found the ship to be enveloped in a driving snowstorm, and it was noted that the snow appeared to be freezing to the wheel-house windows, and that the repeated washing by flying spray was failing to clear it. The ship's position at this time was approximately 15 n.mile south-east of the Lizard lighthouse.

At 0800, a close inspection of the decks showed that the fo'c'sle, port side of the tank deck, catwalk, bridge front, masts and radar pedestal were being gradually coated by a uniform layer of frozen spray, with large icicles of the same apparent on horizontal rungs and railings.

These conditions persisted throughout the next twenty-four hours, with the air temperature gradually dropping to −5.5°C by 0800 on the 13th (when the ship was approaching Jersey). This decrease was put down to the vicinity of the continental land mass, the wind being settled and E'ly, force 7–8 throughout. Upon coming to the anchorage, crew members needed chipping hammers to free the windlass, and 7 cm of granular ice together with quantities of smooth ice were encountered on the fo'c'sle head and catwalk. Photographs were taken twenty-four hours after arrival in Jersey (one of which is shown on the front cover of this journal).

Both watchkeepers, and the Master, with a combined sea-going time of nearly ninety years, agreed that they had never experienced such icing in this area before.

Weather conditions at 0800 on the 12th were: dry bulb −1.5, pressure 1018.3 mb, wind SE'ly, force 7–8.

Position of ship at 0000 GMT on the 12th: 50° 30′N, 06° 00′W.

ICEBERG

Southern Ocean

R.R.S. *Bransfield*. Captain S. J. Lawrence. Antarctic peninsular to South Orkney Islands. Observers: the Master, Mr P. C. Sarjeant, 3rd Officer and ship's company.

27–29 January 1987. Soon after clearing the passage between Elephant Island and Clarence Island, a vast iceberg, as predicted by ice reports and from satellite pictures, was detected by radar. Successive Omega fixes and radar plots determined that the western face of the berg trended north from 61°00′S, 53°46′W to 60°43′S, 53°42′W (a distance of 18 n.mile), and thereafter the northern face trended E'N to 60°32′S, 52°07′W (48 n.mile). In the latter longitude the face of the berg fell away to the south, and the vessel was able to resume course for the South Orkney Islands. The southern extremity of the berg was not determined in either its western or eastern-most longitudes.

In following the 'north coast' of this vast berg at a range of 1.3 n.mile, large numbers of associated bergs, bergy bits, and patches of brash ice were negotiated. The berg also appeared to have created its own micro-climate, as a significant moderation of 5 knots was noted in the wind speed along with a shift in direction to 340°. The air temperature and wet-bulb readings increased to 1.9°C and 1.4 respectively, there was also a reduction in the sea temperature to −0.2, with resultant poor visibility.

When heading back towards the Bransfield Strait two days later, the vessel steered a course of 235° from 60°50′S, 51°00′W. The southern face of the vast berg was not detected on radar, fewer 'standard' bergs were encountered, and pack-ice was but briefly sighted to the south.

At the time of the first observation, weather conditions were: dry bulb 0.1, sea 0.9, wind SE'ly, force 6.

Position of ship on 27 January: 60°54′S, 53°57′W.

CETACEA

North Atlantic Ocean

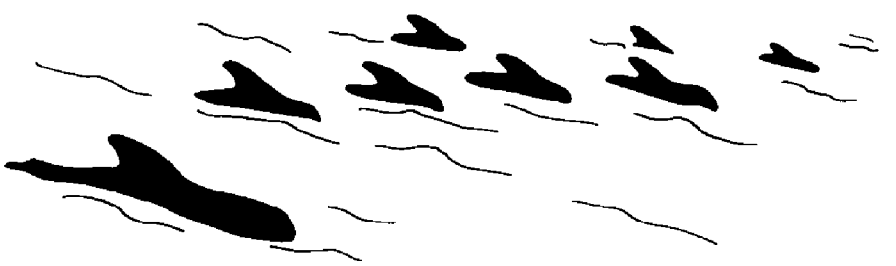
m.v. *Abbey*. Captain R. A. Whistler. Antwerp to Buchanan. Observers: Mr G. M. Webster, 3rd Officer and Mr D. Hobson, Radio Officer.

12 January 1987. Whilst steaming south, a school of whales was observed about half a mile off the port bow at 0930 GMT. At first, they appeared to be stationary, basking on the surface, but as the ship passed them at a distance of 50–100 m, they were observed to be swimming slowly south in line abreast, see first sketch.

Four or five individuals swimming more energetically were also observed in front of, and to the sides of the main group, and one was observed to slap its tail

on the surface. The closest examples were about 4–5 m long, though larger whales (5–6 m) were seen in the main school, which appeared to be unconcerned by the presence of the ship, despite being no more than 50 m away at times. Distinctive curved dorsal fins and bulbous heads suggested that these were pilot whales; their colouring appeared to be a uniform dark grey.

Thirty minutes later, a second school of about sixteen similar whales was sighted, again swimming south in line abreast. This time, they passed within 20–30 m of the starboard side. They were similar in all respects to those observed previously, but a two-tone colouring of dark grey and light grey was more apparent, as shown in the second sketch.



At the time, the dry bulb was 20.0°C, sea temperature 20.5, and the sea was smooth, with a low, northerly swell.

Position of ship: 25° 19′N, 16° 36′W.

Note. Mr D. A. McBrearty, of the Department of Anatomy, University of Cambridge comments:

'The observers are almost certainly correct in identifying these as pilot whales, which, in these latitudes, would be the Short-finned, or Tropical Pilot Whale (*Globicephala macrorhynchus*). The distinctive colour anomaly is interesting. Many schools or pods of pilot whales have light grey, or sometimes white patches on the body. Most observers will know that apart from a light throat patch and a very narrow streak down the belly, the majority of pilot whale schools are overall dark grey, almost black. However, schools are frequently encountered with a varying array of lighter markings. These usually take the form of a "saddle" behind the dorsal fin, or often a patch around the genital region, the forward large chest patch shown in the drawing is one I have not seen before.

'The line abreast pattern of movement is often seen, and could well be connected with foraging.'

Eastern North Atlantic

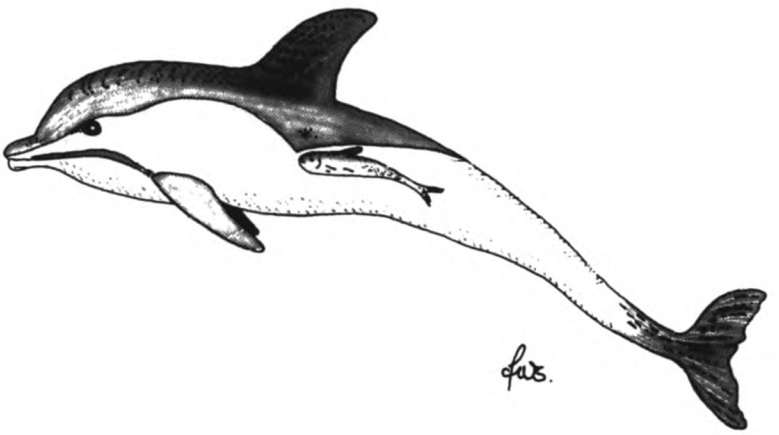
m.v. *Tolaga Bay*. Captain G.C. Barrett, Rotterdam to Melbourne. Observers: Mr J.W. Stockdale, 3rd Officer.

27 January 1987. At 1140 GMT, the ship became surrounded by a large school of dolphins, smaller numbers having been sighted throughout the morning's watch.

There were 50–100 dolphins, far more active than those seen earlier, doing their infamous show of jumping several feet out of the sea. It looked as if they were all trying to jump higher than the previous ones. On one of these individuals, what appeared to be a small fish was noticed stuck to its side, (see sketch), just slightly off the dorsal fin. The dolphin was about 2.4 m long, having the characteristics of a Common Dolphin, whereas the small fish which appeared to be attached to its side was about 45 cm long, and blue/grey in colour.

Was the small fish of the same sort of pilot fish that is known to usually attach itself to the underside of sharks, or was it a young dolphin following its mother?

Position of ship: 10° 46′N, 17° 13′W.



Note. Mr D. A. McBrearty comments:

'A large school of Common Dolphins. The small fish apparently stuck to the side of one of the dolphins would most probably be one of the "remoras". I have seen these before, and they are not unusual on some pelagic, tropical dolphin species.'

Tasman Sea

m.v. *Willowbank*. Captain P. J. Elder. Botany Bay to Melbourne. Observers: the Master, Mr D. E. Ginder, 2nd Officer, Mr K. P. Mowat, 3rd Officer and Mr I. R. Shaw, Radio Officer.

18 March 1987. At 0130 GMT between fifty and sixty dolphins were sighted approximately 1 n.mile from the vessel, they were highly active, and headed towards the starboard bow. There were both adults and juveniles in the group, and they varied in length from about 2.4 m for the adults, to about 1 m for the juveniles. Young dolphins were observed keeping close to their mothers, even during leaping episodes.

All the group (identified as Common Dolphins, *Delphinus delphis*) took an obvious interest in the ship, with large numbers riding the bow wave on either side, and many undertaking inspections of the ship's side. Those dolphins near the ship's side came to within about 4 m of the hull, including mothers with their young.

Throughout the observation, the activity remained hectic, with dolphins leaping the bow wave and others keeping close to the ship's side. The group dissipated quite slowly over a period of about fifteen minutes, their general direction appearing to be westerly. A photograph of one of the dolphins appears opposite page 25.

Weather conditions were: dry bulb 22.6°C, sea 22.6, wind N'E'ly, force 5, swell easterly, height 2 m.

Position of ship: 37°39′S, 150°07′E.

Eastern North Pacific

m.v. *Pacific Teal*. Captain M. L. Miller. Genkai to Balboa. Observers: Mr R. I. Cuthbert, 3rd Officer, Mr P. G. Golson, Radio Officer, Mr K. Archer, passenger, and members of the ship's company.

13 January 1987. At 1420 GMT about thirty dolphins were observed close by the ship. They quickly took up position in the vessel's starboard bow wave, and for the next ten minutes or so, provided the observers with a fine display of acrobatics and 'devil-may-care' fun.

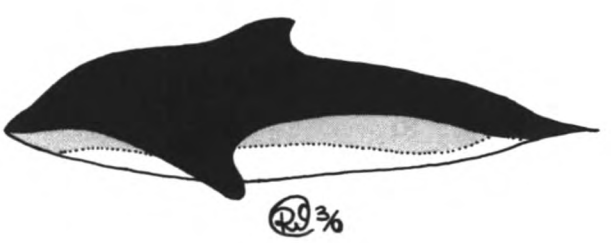
The dolphins were slate grey all over, except for their undersides (see sketch). Many of the individuals were seen to have a slight mottling on their backs, this

may have been lighter, scar tissue, or possibly the ravages of some marine parasite, it did not look as though it was a natural part of the dolphins' skin. On average, the dolphins were in the region of 3 m long, whilst being approximately 60 cm 'deep', and 50 cm 'broad' (both measurements discounting fins). A very prominent ridge was observed in the caudal region.

Whilst in the vicinity of the bow waves, from aft of amidships, the dolphins were seen riding the bow wave while just below the surface. They were also observed leaping clear of the water by about 1.5 m, to land on their sides more often than not. The most unusual sight however, was the dolphins' cart-wheel somersault; they would appear to swim towards one of the bow waves, and just as the wave began, the dolphins would flick their bodies out of the water whilst keeping heads and snouts in the wave, then land on their sides with a resounding 'slap', to finish off heading in the opposite direction i.e., going with the ship.

The frolicking was maintained for a while as the dolphins dropped astern of the vessel.

Shortly after the first sighting, a second group was seen some 5 n.mile off, making an oblique course towards the vessel; however, the closest approach to it was about 0.5 n.mile. Except for the lack of cart-wheeling, these dolphins seemed to copy the antics of the first group, but with even greater enthusiasm if that was possible. There, however, the resemblance ended, for this second group, consisting of around one hundred individuals, was definitely of a different species. The dolphins were about 2.5 m long, with a 'draught' of 70 cm, and 'beam' of 60 cm, looking stockier than the earlier ones, see sketch. The upper



surface was a dark-grey colour, whilst the undersides were off-white, these two colours being separated by a tan area.

During their approach, many of the dolphins were seen to jump clear of the water, mainly in a smooth arc at about 1 m above the surface, whilst a few leaped almost vertically to a height of about 3.5 m before returning to land on their backs.

Position of ship at 1420 GMT: 08° 12′N, 83° 49′W.

Note. Mr D. A. McBrearty comments:

'I think that in this instance the observers were looking at a couple of the *Stenella* species.

'There are many geographical forms of spinner, and spotted dolphin in tropical and sub-tropical waters world wide. Some of the spotted forms have so few spots, particularly when physically immature, that they are difficult to differentiate at sea; especially as all are capable of fast swimming and leaping, and thereby adding to the confusion of identity.

'The descriptions of spinner dolphins contained in several books and sea guides are largely based on the descriptions of dolphins taken in tuna-fishing operations in the eastern Pacific Ocean. Monitoring of these operations by the United States Fish and Wildlife Service has had a two-fold effect. Firstly, it has dramatically reduced the numbers of dolphins killed annually incidental to fishing. Before regulation, the number killed was in the order of 250,000 annually; last year [1986], the mortality rate was down to an estimated 20,692. Secondly, examination and measurement of these casualties has resulted in many publications and a great deal of information on the *Stenella* genus in this part of the world.

'Much of this information is pertinent to other geographical stocks of *Stenella* world wide, some of it may not be. By comparison, information on the genus in other areas comes from occasional strandings and is meagre. There are some obvious similarities between regional stocks, but there are also observed differences, and there is still much debate and speculation about this genus.'

FISH

Sea of Japan

m.v. *Galpara*. Captain C. A. Hatcher. Off Yosu. Observers: Mr A. L. Selmer, Chief Officer, Mr J. B. Moulds, 2nd Officer and Mr C. R. Pratt, 3rd Officer.

3 February 1987. The fish shown in the sketch was found lying on the deck. It measured 44 cm in length, and had a silvery 'skin' which easily rubbed off, its height was 2.2 cm, and the maximum body width was 0.9 cm. The tail did not appear to open out at all, but just tapered off, as shown in the sketch.

It was also well endowed with a particularly vicious set of 'molars', which are shown in the enlarged sketch.

Position of ship: 34° 30′N, 128° 00′E.

Note. Dr F. Evans, of the Dove Marine Observatory, University of Newcastle upon Tyne, comments:

'The drawing, carefully accurate, is of a Cutlass Fish. These fish are sometimes called Hair-tails, having a long, band-like body tapering posteriorly to a fine point. In this respect they differ from the related scabbard fishes, which are similar in appearance, but which do have a small, forked caudal or tail fin. The locality of capture suggests that the present example is the common Indo-Pacific species, *Trichiurus savala*. There is an Atlantic species also occurring in warm water but occasionally straying as far north as the Channel and the Gulf of Maine. The two species are found respectively east and west of Cape Agulhas in South Africa; they do not mix. They are generally confined to continental shelf waters, ranging from shallow, sandy estuaries to depths of 500 m.

'There are long fangs in the jaws, as the illustration chillingly shows. The creatures are obviously predators, feeding, it is said, on small pelagic fish especially anchovies, and on small squid, prawns and mantis shrimps. The Cutlass Fish often assumes a vertical stance in the water with its head pointing forward and its long body trailing downwards. The purpose of this distinctive behaviour is not known.

'Cutlass Fish are often found in shoals, and are fished for commercially. They are good food fish although the flesh is sparse.'

BIRDS

North Sea

s.s.v. *Seagair*. Captain M. P. Easton. On station Magnus Oil Field. Observers: the Master, Mr C. Adams, Chief Officer and Mr N. J. Pengelly, 2nd Officer.

6–7 January 1987. At 1030 GMT a swan landed on the deck, having been sighted the previous afternoon flying around the ship, and also sitting in the water. The Magnus Platform was informed, and instructions awaited. From the *Hamlyn Guide to the Birds of Britain and Europe*, the bird was identified as an immature Whooper Swan, which was thought to have been caught in a south-easterly storm of 4 January. At 1400 the vessel was advised to catch the swan and move it to somewhere warm. An hour later, the bird was in a canvas bag in the hospital bath, and seemed to be reviving with the warmth. It had been very easy to catch, offering little resistance or animosity.

At 2300 the swan was given a deep container of water. Its wings were bound, and its body was still in the canvas bag, but it was, by this time, very much revived. Instructions were received from B.P. Dyce to the effect that the swan should be shipped ashore the following day on the crew-change helicopter.

The next day at 0800, the swan was transferred to a new bag, having had its wings rebound, and then placed in a cardboard box for the flight to Dyce, in the care of the Master. It was last seen in Customs Clearance at Dyce, and later the vessel was informed that the swan had arrived at the Royal Society for the Protection of Birds, Aberdeen, where it had been X-rayed for shot, and released after two days.

Position of ship: 61° 36′N, 01° 18′E.

Note. Captain P.W.G Chilman, of the Royal Naval Birdwatching Society, comments:

'A most interesting report. Whooper Swans breed in the Arctic, and winter on the coasts of Norway and north-east Europe, in Britain and also on the Black Sea and Caspian Sea. As suggested, it was probably caught in a gale, otherwise it would have been settled in its winter quarters at that date, not migrating.'

Black Sea

m.v. *Havdrott*. Captain C. A. Hatcher. At anchor off Port Yuzhnyy. Observers: Mr A. L. Selmer, Chief Officer, Mr J. B. Moulds, 2nd Officer, Mr C. R. Pratt, 3rd Officer and ship's company.

27–30 March 1987. During this period, the vessel was visited by several birds of prey. A few kestrels were sighted on the 27th, but they were too far away for accurate details to be noted.

At 0100 GMT on the 29th, what was thought to be a Snowy Owl flew past the vessel, and then returned to perch on the side rail. Although artificial lighting may have masked some of the colours, the owl had light (cream) colouring, with slightly darker flecks on the back and chest. The eyes were a striking yellow, and the bird appeared to be at least 45 cm tall. Whilst perching, it gave the overall impression that it was very nervous, and was only visiting the ship for a brief rest.

During the next day, there were what appeared to be a couple of Long-eared Owls flying around the ship; one joining in the morning, the other one in the afternoon. The most striking features of the owls were the distinctive 'V-shaped' markings between the eyes, leading up to the black ear tufts. Throughout the day, they were observed by most of the ship's company. When undisturbed, the owls would sit for long periods on the rails/pipes or activators, and their heads would rotate continually from one side round to the other. It was also noticed that the birds appeared to have favourite landing places to which they would return if disturbed.

At 2100 on the 30th a falcon was spotted. Although unidentified, it kindly remained long enough to allow itself to be sketched. It was slate grey, with a few

white patches on its back, and what appeared to be white 'eyebrows'. There were also two distinct white patches on the back of its head. The bird had a strongly barred grey and black tail, whereas the underside of its body was white with black speckles.

At first, it was thought to be a Peregrine Falcon, but on second glance, the distinctive black 'moustache' was not evident. However, this bird was approximately that size and shape.

Position of ship: 46°32′N, 30°58′E.

Note. Captain P.W.G. Chilman comments:

'A nice sketch. This is not a falcon, but almost certainly a Goshawk (*Accipiter gentilis*). The white stripe over the eye, together with the slate grey colour is diagnostic. The female is much larger and somewhat browner than the male, but I cannot tell which from the sketch. The white patches on the back are probably due to moult. Occurs in Europe, northern Asia and North America, with a preference for coniferous woodland.'

Red Sea

m.v. *Tokyo Bay.* Captain R. P. Royan. Port Klang to Jeddah. Observers: Mr M. J. Trafford, 2nd Officer and members of ship's company.

5 February 1987. At about 0900 GMT a bird, shown in the photograph opposite page 25, and described as a 'type of parakeet' was seen on board the ship. Unfortunately, no appropriate books were available, so it was not possible to make a more specific identification.

The bird's general description was as follows: total length about 35 cm, very light green to lime-green in overall colour, but with a blue tinge to the top tail feathers, yellow undersides. Its main distinguishing features were the bright orange/red beak and also the orange band with a pink hue at the edges around the neck. The parakeet had orange eyes with black pupils.

It stayed on the ship until arrival in Jeddah, where it is presumed to have flown off.

Position of ship: 19°00′N, 39°30′E.

Note. Captain P.W.G. Chilman comments:

'This is a Ring-necked Parakeet (Psittacula krameri), a fine-looking male. The female is the same except that it does not have the ring round the neck. These parakeets live in trees around cultivation, and they are supposed to be gregarious, so why one should appear alone in the middle of the breeding season is a mystery.'

North Pacific Ocean

m.v. *Wellington Star.* Captain D. A. Ganderton. Honolulu to Oakland. Observers: Mr H. A. Roberts, Chief Officer, Mr D. A. Parsons, 2nd Officer, Mr C. M. Grimmett, 3rd Officer and Mr G. Shaw, Radio Officer.

10 February 1987. A large number of Laysan Albatrosses had been following the ship for several days, and whilst it was stopped and drifting, the birds settled on the water close by.

In the early afternoon, one bird was observed to land clumsily on top of a container on No. 3 hatch, followed moments later by another, which pitched forward heavily on landing. After resting for a short time, the two birds took up

positions facing each other, and carried out a mating 'dance' which consisted of bobbing heads in unison, then holding heads and bills vertically, sometimes in unison, sometimes not, followed by each bird placing its bill momentarily under one wing.

Afterwards, the birds circled each other with a comical, rolling gait and heads bobbing as before, they then approached each other, and appeared to be 'bill fencing', all the time making a loud clacking noise made by bringing the upper and lower mandibles together sharply, see photographs opposite page 25. They were seen to adopt mating position during the above ritual, which they repeated several times.

When the albatrosses first landed, no ship's personnel were on deck, but later, at least four seamen started to work in close proximity below the level of the container top, the height of which was about 2.4 m above the hatch top. However, the birds appeared unconcerned at the noise and activity, ignoring it all. Later, when approached closely for more photographs, they carried on with their ritual for a while, but appeared nervous and distracted; however, they allowed approach to within about 1.5 m before moving away.

Approximately ten minutes after the photographer climbed onto their container, one bird stumbled clumsily across to the windward edge of the containers, and after a few moments perched with wings partly extended, flew off by launching itself with wings fully extended into the air, swooping down at a shallow angle toward the sea surface before levelling out and gliding away just above the wave tops. The remaining bird regurgitated a dark, thick, oily liquid when approached to within 1 m. Eventually, it was coaxed to the edge of the boxes, and flew off in the same manner as its mate. They had been on board for about two hours.

It was almost certain that they were Laysan Albatrosses, but they had dark 'eye shadow' patches. Tuck and Heinzel's book *A Field Guide to the Seabirds of Britain and the World* does not show these, but the patches do appear on the illustration of the Shy or White-capped Albatross. All other features matched with the Laysan's description.

Position of ship: 34°00'N, 134°00'W.

Equatorial Eastern Pacific

m.v. *ACT 7*. Captain D. Newlin. Port Chalmers to Balboa. Observers: Mr S. R. Pridmore, 2nd Officer, Mr P. J. Neve, 3rd Officer and Mr N. R. Smirk, Radio Officer.

20 January 1987. At about 1500 GMT the Radio Officer noticed a very curious-looking bird strolling along the port bridge-wing deck. It was immediately apparent that this was not a seabird as such, but some sort of wader.

As shown in the photograph taken by the Second Officer, opposite page 9, its overall colouring was brown/red ('Rhode Island' red), and it measured about 25 cm from head to tail, with legs as long again, and toes which were each about 8–10 cm long! Its feet were not webbed, and the bird walked with a long, jerky gait. The body itself was reminiscent of a water fowl, the long legs and splayed-out feet suggesting a marsh wader, whereas the beak was thick and powerful in shape, somewhat like that of the British Bullfinch.

The bird refused to take water or various foods offered, preferring to hide away in an inaccessible corner of the bridge wing, remaining there for about nine hours, by which time it was dark. As the bird was not seen again, it was assumed to have flown off, the nearest land being some 80 n.mile away.

Unfortunately, there was no bird literature on board for the area, but there were similarities between this bird and the Purple Gallinule (*Porphyrio spp.*), and the flightless Takahe (*Notornis mantelli*) of New Zealand, but lacking the extension of the beak over the front of the face.

At the time of first observation, the wind was SE'ly, force 3, and the weather conditions were clear, apart from heavy showers.

Position of ship: 03°31′S, 82°20′W.

Note. Commander M. B. Casement, Chairman of the Royal Naval Birdwatching Society, comments:

'This is probably a juvenile American Purple Gallinule (*Porphyrio martinica*). A large, "moorhen-type" bird, it breeds in Central America, and frequently comes on board ships during migration, although this observation is at a strange time of the year.'

JELLYFISH

Red Sea

m.v. *Pikebank*. Captain T. D. Scott. Hodeidah to Aqaba. Observers: the Master and ship's company.

4–9 March 1987. Whilst on passage, large concentrations of jellyfish were observed in the vessel's wake. Their density was such that at the ship's speed of 16.5 knots, they were immediately apparent.

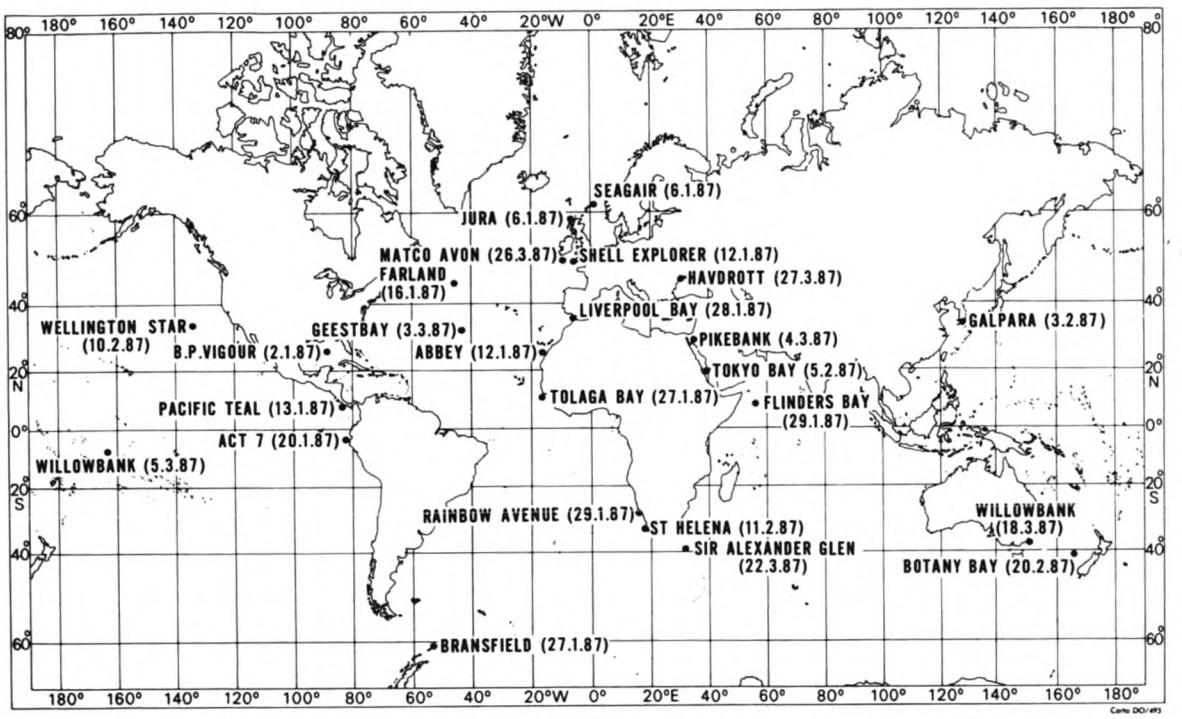
Whilst both alongside, and drifting at Aqaba, the density was sufficient at times to make broad swathes of water appear to be solid with them. The jellyfish seemed to be about 20–30 cm in diameter, having a purple hue to the opaque sections around their edges and at their centres. Such concentrations had rarely, or never been seen by members of the ship's complement, and the harbour Pilot said that it was very unusual to see so many jellyfish at Aqaba.

Weather conditions were: wind NW'ly, force 3–6, clear skies, but with a dust haze, sea-water temperature remaining at about 25.0°C until entering the Gulf of Aqaba.

Position of ship: 20°31′N, 35°01′E.

Note. Dr F. Evans comments:

'While it is not possible to give a confident identification from the description, the most likely species appears to be *Aurelia aurita*, commonly called Moon jellies or Eighty-eights (because the four central, crescentic, purple gonads resemble the digits "88"). *Aurelia* has a very widespread distribution; it is found commonly around the British coast for instance, and is established in the Gulf of Aqaba. It is an annual. In temperate seas it grows up in the spring, and reaches its largest size in the autumn before breeding and disappearing. Generally speaking, it is a shallow-water species. The authority on jellyfish, F. S. Russell, has noted that there may be a considerable year-to-year variation in abundance, and this must have been an exceptional year in the Red Sea. The size of 30 cm given in the report is about the normal maximum for this jelly.'



Position of ships whose reports appear in *The Marine Observers' Log*

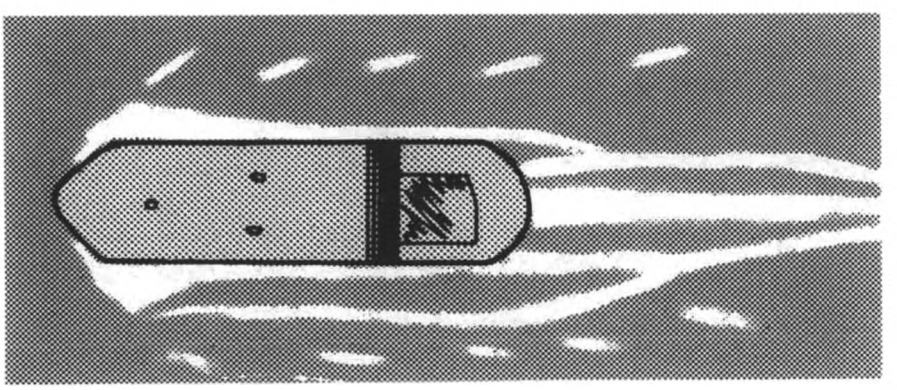
BIOLUMINESCENCE

Gulf of Mexico

m.v. *B.P. Vigour*. Captain J. L. W. Dwight. Freeport to Corpus Christi. Observers: Mr H. J. Conlon, 2nd Officer, Mr C. N. Curran and Mr D. K. Corlett, 3rd Officers.

2–3 January 1987. At 2330 GMT, bioluminescence was first sighted, and was very noticeable in the stem wake. A vague green in colour, it formed three separate bands of glowing sea, each of about 3 m wide. Visible for as far as the eye could see, the bands joined about 1 n.mile aft of the vessel. This formation was the brightest of those observed.

On the port side (lee), two separate bands were noted, with occasional patches beyond them, whilst on the starboard side, there was only one band, again with occasional patches forming beyond it, see sketch. Although the phenomenon did not show very brightly, it was quite noticeable throughout the night.



Throughout the period, large flashes or very bright spots were noticed passing down the ship's side. These were fixed spots of intense light, 0.5 m in diameter,

Meteorological Office Marine Division staff and visitors attending the Port Meteorological Officers' Conference at Bracknell Headquarters on 30 September. Left to right, standing: Captain J.F.T. Houghton (Headquarters); Miss J. Mitchell (Publications); Captain M.L. McN.Coombs (Headquarters); Captain P.B. Hall (METROUTE); Captain C.A.S. Borthwick (METROUTE); Captain D.H. Rutherford (NE England); Captain S.M. Norwell (Scotland and Northern Ireland); Captain A.F. Ashton (Bristol Channel); Mr W.G. Cullen (NW England); Captain D.R. McWhan (SW England); Captain C.R. Downes (SE England). Seated: Mr J-P. Sandra (Le Havre); Dr E. De Dycker (Brussels); Mr J. Guehne (Hamburg); Mr P. Schnitker (Rotterdam); Captain A. Britain (E England and Ocean Weather Ship Officer); Captain R.C. Cameron (Deputy Marine Superintendent); Captain G.V. Mackie (Marine Superintendent); Dr P. Ryder (Deputy Director, Observational Services); Mr R.J. Shearman (Marine Advisory, Consultancy and Data Services). Absent: Captain J.A. Williamson (METROUTE); Miss J.G. Caudrelier (Scientific Officer, Instruments).
(See Page 33).

Opposite page 24

Opposite page 25

Photo. by K.P. Mowat

Dolphin photographed from m.v. *Willowbank* (see page 16).

Photo. by Mrs D. Scrimgour

Parakeet on board m.v. *Tokyo Bay* (see page 21).

Photos. by G. Shaw

Courting albatrosses on board m.v. *Wellington Star* (see page 22).

and remained very bright until well astern. They were also seen in the wake, where they occurred more frequently. At about 0500 on the 3rd, they changed to rapid light flashes in the wake, some of them being up to 1 m in diameter, before becoming far less frequent by 0800.

Weather conditions at the time of the first sighting were: dry bulb 19.0°C, wind NW'ly, force 2–3. Cloud cover of altostratus with an opaque moon showing. Ship's speed 15 knots throughout.

Position of ship 2330 GMT on the 2nd: 25° 17'N, 87° 20'W.

Note. Dr P. J. Herring comments:

'This account clearly involves many different kinds of luminous organisms and indicates a sea area of high biological productivity. The main light in the wake and down the sides of the vessel would probably have been caused by single-celled dinoflagellates at or near the surface. In dense concentrations they can produce most impressive luminescence. The larger flashes were clearly something else, probably a variety of jellies, and the half-metre spots of light may have been local schools of small shrimp or young fish also disturbing the dinoflagellates.'

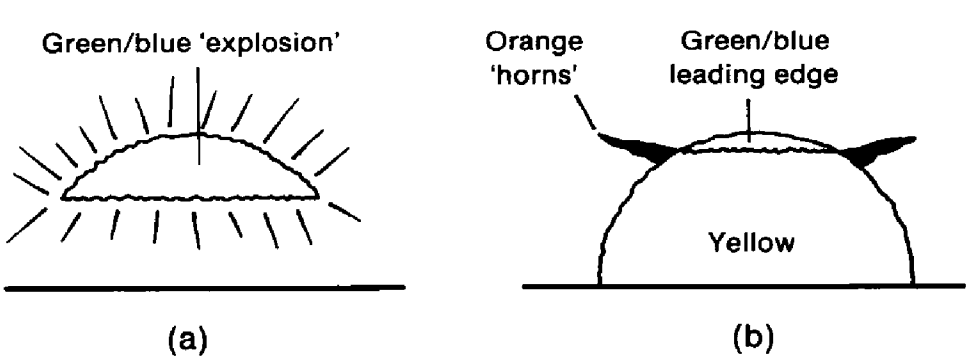
ABNORMAL REFRACTION

Arabian Sea

m.v. *Flinders Bay*. Captain D. A. Dornom. Fremantle to Jeddah. Observer: Mr K. C. Riddick, 2nd Officer.

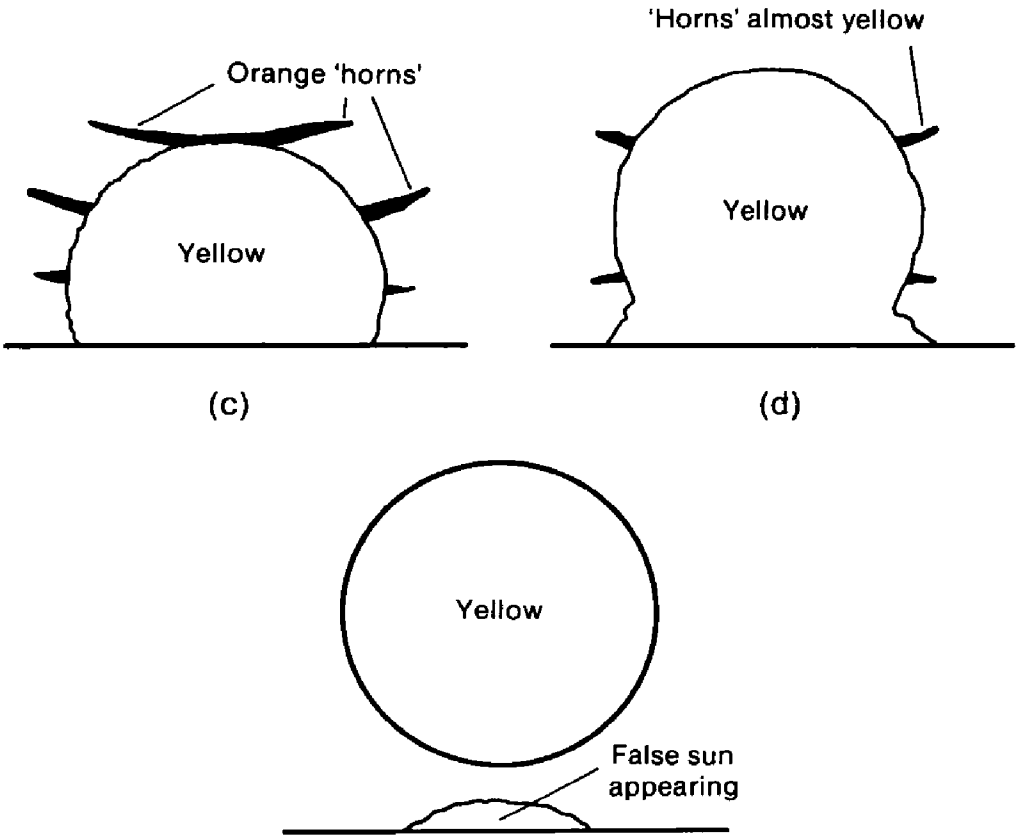
29 January 1987. At sunrise, a green flash was observed, followed by abnormal refraction until the sun was approximately a semi-diameter above the horizon. At this time, the sky was clear apart from a few parallel bands of cloud located on either side of, and above the position of the sun.

The upper limb of the sun 'exploded' into view with a green/blue flash as in sketch (a), then the remainder of the sun rapidly appeared, with orange 'horns'



appearing on either side of the diminishing green/blue upper limb, as in sketch (b). Next, the upper limb became capped with orange horns, with more

appearing lower down, sketch (c), and the sun then took on the appearance of a spherical buoy as the horns began to fade, sketch (d).



Finally, the horns disappeared completely, and a false sun formed briefly below the true disc, sketch (e).

Position of ship: 08°09′N, 56°33′E.

NACREOUS CLOUDS

North Minch

f.p.v. *Jura*. Captain S. S. Lockhart. On fishery protection duties. Observers: Mr B. A. Hall, Officer in charge, Mr J. Barkess, 1st Officer and Mr W. Rendle, 2nd Officer.

6 January 1987. Whilst on patrol, nacreous clouds were observed to the south-east at 0855 GMT. The centre of the display bore 135°, the arc covered was approximately 15° of the horizon, and the maximum altitude was 7°. It was difficult to judge the distance, but the position of the clouds appeared to be overhead in the central Scottish Highlands. Other cloud cover at the time consisted of 4 oktas cumulus and stratocumulus, accompanied by traces of altocumulus.

The observers' initial reaction was to identify the clouds as lenticular altocumulus 'back-lit' by the rising sun, although this was before the comments in *Cloud Types for Observers* had been noted. The clouds showed irridescence in shades of red and green, but this effect faded just as photographs were being

taken, and the clouds appear to be only glowing white in the picture shown opposite page 8. However, their brightness, when compared to those normally seen during winter sunrise, can be seen by the reflections on the sea surface. At 0905, lower clouds obscured the display, thus preventing any further viewing.

Weather conditions at the time were: dry bulb 5.0°C, pressure 1019.1 mb, wind N'E'ly, force 7.

Position of ship: 57°58'N, 06°15'W.

METEORITE

North Atlantic Ocean

m.v. *Geestbay*. Captain D. Boon. Barry to Antigua. Observers: Mr J. R. Parfitt, 3rd Officer, Mr R. T. Jolliffe, Radio officer and Mr A. Ferguson, A.B.

3 March 1987. At 0240 GMT a large meteorite passed directly over the ship, from aft to for'ard. The white illumination produced by the meteorite was of such itensity that it lit up the entire main deck. Brighter than the ship's own flood-lights, its duration was approximately two seconds.

The meteorite was low enough to pass under most of the cloud, seemingly to disappear into it. Bright fragments trailed off along its flight path. No sound was heard, and no other meteorite activity was noted. At the time, the sky cover was 4 oktas of small cumulus at 1,000–2,000 feet.

Position of ship: 32°54'N, 43°30'W.

Note. Mr H. Miles, Director of the Artificial Satellite Section, British Astronomical Association, comments:

'Quite an interesting event. It was for certain the entry into the atmosphere of a natural object, possibly consisting of cometary material. It is thought the belief that the object was below the cloud stems from what was an optical illusion. What is more likely is that it was so bright, its light easily penetrated the cloud, and that its disappearance came when the light fell to a value that the cloud could stop.

'Added evidence for this is the fact that no noise was heard. If it had been below the cloud, there would have been at least an intense sonic boom. In addition, it is not thought that the object could still have been shining at such a low height without being seen to hit the surface. This was obviously not seen, otherwise the report would have consisted of several pages and not a few lines!'

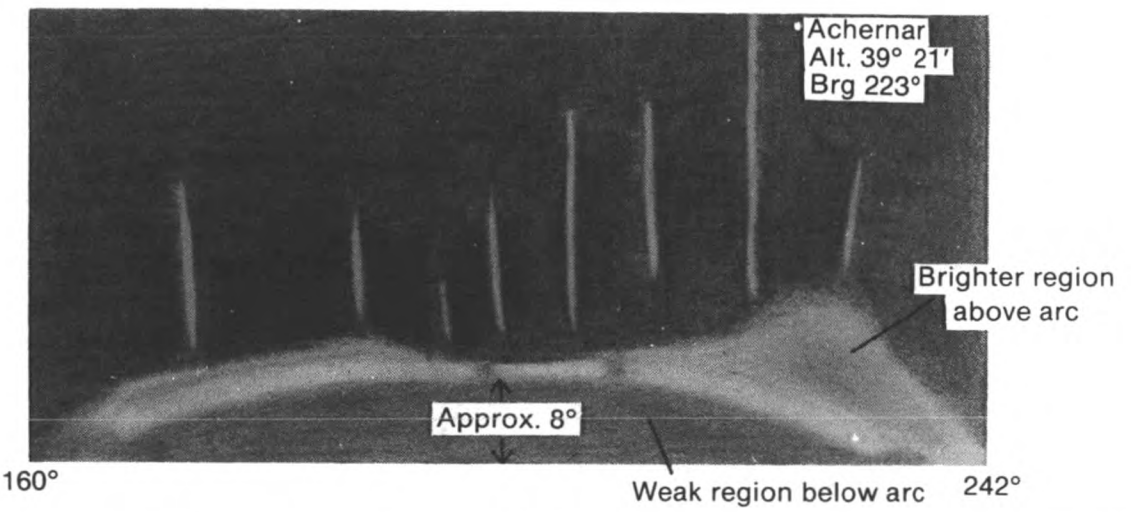
AURORA AUSTRALIS

Tasman Sea

m.v. *Botany Bay*. Captain R. T. Wood. Wellington to Burnie (Tasmania). Observers: Mr A. Titley, 2nd Officer, Mr N. E. Gardiner, 3rd Officer and most of ship's company.

20 February 1987. At 0930 GMT a dull glow was observed on the southern horizon over an arc of approximately 30°. By 0948, the arc had increased to some 82°, bearing 160°–242° from the ship. At this time, several rays were noted extending upwards, the highest one reaching above Achernar, together with a distinct, but broken arc of approximate maximum altitude of 8°, running through the glow. Above this arc, the glow was 'moderate', whilst below, it was

'weak' (as defined in the *Marine Observer's Handbook*). The sketch illustrates the effect seen.



After 0948, the spectacle diminished slowly, with the long rays disappearing first, followed by the arc, although 'shadows' appeared in the remaining glow which was still to be seen an hour later, albeit in a much weaker form.

Earlier, at sunset, a green flash was observed and the Radio Officer had reported exceptionally good reception, being able to hear Portishead Radio very clearly.

Position of ship at 0948 GMT: 40°53′S, 165°44′E.

SATELLITE RE-ENTRY

Southern Ocean

m.v. *Sir Alexander Glen.* Captain F. A. M. B. Davies. Tubarao to Japan. Observers: Mr T. Wiltshire, Chief Officer, Mr T. Moseley, 2nd Officer and members of ship's company.

22 March 1987. At approximately 2148 GMT a satellite was observed re-entering the Earth's atmosphere. It was first seen bearing 300° and was travelling northwards across the sky at an altitude of about 2° for a period of at least ninety seconds, before disappearing behind cumulus clouds on the horizon when bearing 340°. Height of eye was 24 m.

The satellite appeared as a long, bright-orange, fiery streak, moving slowly at constant altitude, with incandescent fragments falling away behind it. At least one of the larger fragments continued to glow for several seconds, and followed a parallel path to the main body before disintegrating. Not appearing to be losing altitude, the satellite was still far brighter than any other star when it was obscured by cloud on the northern horizon.

At the time of observation, the wind was E'ly, force 4, and cloud cover was 1 okta of cumulus.

Position of ship: 39°19′S, 32°38′E.

Note. Mr H. Miles comments:

'The phenomenon observed was the re-entry of 86–35C, the orbital module associated with Soyez-TM1. Soyez-TM1 docked with the Soviet Space Station MIR (front port) on 23 May, 1986, and undocked on 29 May.'

Weather Influences on Battles and Invasions*

By Lieutenant Commander S.J. Auty, R.N.
(Directorate of Naval Oceanography and Meteorology)

The Battle of Trafalgar 1805

Dr Wheeler [Sunderland Polytechnic] has already published an article on the battle in the November 1985 issue of *Weather*, so I will merely write a brief synopsis of his presentation. It is of interest that he used ships' logs as one source of reference and although weather observations were not necessarily accurately quantified, he was still able to estimate weather conditions from the descriptions written in the logs — OOWs and METOC Officers please note! The log of H.M.S. *Euryalus* yielded information that between 1 and 19 October the weather was perfect for open blockade and it would be reasonable to assume that the Azores anticyclone was dominant. The enemy fleet sailed on 20 October. H.M.S. *Conqueror*'s observation was "SSW rising strong breezes, squalls and rain". The frigate, close inshore, reported variable winds. Using observations from ships, Goodwood House and Newcastle, Dr Wheeler concluded that between 20 and 30 October the winds in the battle area were generally SW force 7 or greater and were caused by a depression. This weather had a significant effect on the outcome of the battle because the enemy ships did not handle well in high winds and seas. Although the wind dropped on 21 October, there was still a heavy westerly swell and so the French fleet turned north and Nelson launched his famous two-column attack. The outcome of the battle is well known but what caused the post-battle storm? Dr Wheeler put forward two possibilities:

a. a recurving Tropical Cyclone;
b. an intense cut-off low.

He stated that he could find no record of a Tropical Cyclone in the area during any October but that cut-off lows with duration of 3 to 4 days were not uncommon and there is on record a case of a cut-off low lasting 10 days. He, therefore, preferred the second of the two possibilities. Mr Pothecary [Meteorological Office] and Mr Ratliffe, however, pointed out that the heavy westerly swell was more consistent with an advancing Tropical Cyclone being embedded in a warm sector, so that they preferred the first option. Of course it is impossible to say which is correct, but it is interesting to ponder, again, that the Royal Navy might have been helped by a rare Tropical Cyclone!

The Crimean War 1854

The interesting feature of the weather in this campaign was that for once it acted against the British. Early November was rather stormy and on 10–11 November about 5 ships were broken up in a storm. Unfortunately no lessons were learnt because on 13 November all the ships were still lying in the same place when a low became established over the gulf to the northwest of Crimea, the resulting storm wrecked 21 British ships (mainly warships) and 16 French ships (mainly merchant ships) as well as dismasting a further 8 British ships. The Russians lost none because they had anchored in the safety of the Sebastopol Roadstead. The consequences of this disaster for the British were of great significance. Boots,

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* The last of three sections of an article reproduced from *DNOM Newsletter*, Summer 1986, by kind permission of the Director of Naval Oceanography and Meteorology

greatcoats and ammunition were lost which did little to help the poor soldiers already suffering from exposure. The campaign was totally disorganised and the Press accused the General and the government of incompetence, which led to Aberdeen resigning in the January. It is fair to say that the storm was a major contributory factor in the fall of the government. One useful outcome was that the French realised the need to be warned of severe weather and they established a meteorological telegraph which proved to be an important step on the way to the use of synoptic meteorology. You may be asking whether the low could have been predicted. The only information available from the Meteorological Office was that it was unusual.

Conclusion

As expected, the dominant meteorological element in each case was the wind. In all but the battle of Salamis, it was the difficult conditions produced by strong winds which created problems for the opponents and those who best mastered the conditions proved victorious.

Although the Royal Navy no longer depends on sail as a means of propulsion, it is still true today that the Captain with a detailed knowledge and understanding of the environment, above and below the sea surface, is in a stronger tactical position. In the past it could be argued that the losers were unlucky when the weather did not favour them and when they did not have the advantage of good forecasting. This reasoning, of course, should not apply today when a good forecasting service is available to all Captains, via onboard forecasters or shore-based weather centres, enabling him to make tactical use of the weather if necessary. The Captain or Service with the best forecast often holds an advantage over those without, so it is worth noting that, unless we wish to return to the 'chance' situations of previous centuries, it is imperative that forecasters provide the command with accurate forecasts ... something to remember at your next brief!

The computerised index of Observing Officers' records

By B.S. Fullagar
(Meteorological Office, Bracknell)

Introduction

For many years the Marine Division of the Meteorological Office has maintained a card-index containing details of Voluntary Observing Fleet officers' observing records. This index is used to identify Masters and Officers who qualify for Excellent Awards or Long-Service Awards. Over the years, the index became large and onerous to update, and in these days of contracting staff resources, it became desirable, and indeed necessary, to develop a computerised index to serve the same purpose. The task of putting the cards onto the computer

was started late in 1985. During 1986, the two systems — computerised and manual — were run in parallel. At the beginning of 1987, the use of the old card-index ceased, with updating being carried out on the computerised version only.

The Computerised Index

The index consists of two main types of dataset. The first, usually referred to as 'Names' by our staff, contains very brief details as shown in Table 1.

Table 1 — Examples of details held in the 'Names' dataset

UK011907	JONES	AEH	5	75	86	44240	
R409615	JONES	AP	0	62	86	44651	PACIFIC PRESTIGE
R711363	JONES	AW	5	64	87	44777	BALTIC ADVENTURER
R906790	JONES	AW	2	76	86	44646	PACIFIC PEACE FURNESS
R840200	JONES	BD	0	70	85	42837	
UK018989	JONES	BLL	3	79	86	44634	CGM PROVENCE T&JHAR
R676938	JONES	BM	0	76	87	44801	W. A. MATHER CPSHIP
R685165	JONES	BN	1	64	86	44392	BARBER HECTOR OCEAN T
R404485	JONES	BW	0	52	85	43065	
R677929	JONES	DJ	1	70	86	44426	WELLINGTON STAR BLUE
R578386	JONES	DL	0	70	86	44346	FORTHBANK BANK
R357015	JONES	DV		86	86	44262	CELTIC CHALLENGER CMWILL
R911000	JONES	DW	3	77	86	43918	
R576779	JONES	EA	0	59	86	44370	PACIFIC PATRIOT
UK069170	JONES	GMA	3	85	86	43757	
R863615	JONES	GR	1	84	85	42762	
UK028544	JONES	HL	2	87	87	45089	MATCO THAMES MOBIL
R547873	JONES	H	5	86	86	44180	PACIF COURAGE FURNESS
R667189	JONES	H	0	78	86	44246	
UK077094	JONES	J	5	86	86	44648	MAERSK HARRIER MAERSK
R307006	JONES	JG	0	52	86	43869	

Note. From left to right, the columns contain: Discharge Book Number, surname, initials, code figure for rank, first year of observing, latest year of observing, latest logbook number, current ship, company.

The second type of dataset is the 'Library' which contains 'cards' for each officer, and gives a more detailed record of the officer's observing career, as in Table 2.

Table 2 — Fictitious example of a 'Library' dataset entry

Name Smith-Jones A.J.S. Number UKnnnnnn Rank Chief Officer
Company Atlantic Steamers Ltd

Ship	Logno.	Date	Award	Rank	Cpny
Bracknell Star	31126	290875		3rd	Starline
"	32899	180676	1977		
Bagshot Star	33250	121276		2nd	
Atlantic Queen	36677	050780		1st	A.Stms
Pacific Queen	37044	230381	1981		

As can be seen, neither type of dataset contains any sensitive, personal information.

The main problem at the beginning was how to identify each card on the library. Surnames can of course be duplicated and so can surname/initials combinations. A surname/rank combination can also change, so the obvious choice for a unique identifier was the Discharge Book Number (DBN). Once this was decided upon, a request for officers to supply their DBN was published in this journal, and a label with the same request is now affixed to all logbooks as they are issued. The response to this request was very good initially, but unfortunately has not been maintained in all cases.

As each logbook is received in the office, the cards on the libraries are updated directly from the information in the back of the logbook. If the DBN is missing, the staff need to look at the 'Names' dataset to try to obtain a DBN which corresponds with the officer's name. If the name, initials, rank and ship all match, staff can be confident that they have the correct person, but even on the computer, this takes time. However, if the officer has not used his full initials, or his rank or ship have changed (or our records do not as yet contain full details), then the position becomes less certain. In some cases, staff have to refer back to the old card-index, but this is very time-consuming, and as the old cards are no longer updated, the chances of getting a good 'match' become smaller with the passage of time. Therefore, although every effort is made to ensure that officers' records are fully updated, there is the risk, if there is any uncertainty of identification, that an entry could be missed and this in turn could jeopardise that officer's chances of receiving an award for his efforts.

The logbooks are not kept in the one office after receipt, but are sent on to other sections to have the data (the observations) 'keyed' into a dataset. Some logbooks may in fact be sent out of the area for keying, and then returned several weeks later, so are not necessarily available to refer back to. Eventually, the logbooks end up in the section affectionally known as 'Dusty Archives' where they become public records, and are available for anyone, including the general public, to examine on request. The data, when processed, are included in our Marine Data Bank, and may also be sent to foreign meteorological services.

From the foregoing description, it can be clearly seen that it is important that the full, correct DBN is entered clearly in each logbook. This will ensure that officers' records are fully updated, that awards are made where deserved, and of course our job will then be made a little easier. Should any officer prefer not to have his record on the computer, even though details are fairly impersonal, he has only to indicate this in the logbook and we shall comply with his wishes.

Summary

The computerised index of observing officers' records has been developed with the aim of having an efficient and easily accessible system which will ensure that those officers consistently returning excellent observations will have their efforts recognised and will receive an award. However, achieving this requires all officers to provide their full DBN in each logbook returned to the Met. Office.

Port Meteorological Officers' Conference

The sixth United Kingdom Port Meteorological Officers' Conference was held at Bracknell Headquarters on 30 September 1987. In opening the morning session, Dr P. Ryder, Deputy Director, Observational Services, extended a special welcome to the representatives from the Netherlands, Federal Republic of Germany, Belgium and France, all of whom had been invited for the first time. A total of 22 persons attended the opening, the only absentee owing to illness being Miss J. Caudrelier who had attended every previous conference in her 30 years with the Marine Division of the Met. Office (see photograph opposite page 24).

Dr Ryder expressed his satisfaction that the United Kingdom Voluntary Observing Fleet (VOF) was being maintained at a reasonable level despite the depressed state of the shipping industry, and extended thanks to all Port Met. Officers, including colleagues from across the water, for their recruiting efforts. He stressed the importance of quality and timeliness of VOF observations, vital factors in the Met. Office's obligation to provide the user with a reliable and efficient service. Port Meteorological Officers were requested to encourage feedback from ships' Masters, officers and shipping company superintendents, providing users' opinion of the products from the Met. Office.

From the Chair, the Marine Superintendent, Captain G.V. Mackie, made several suggestions for ways in which mutual co-operation between observers and the Met. Office might be beneficial. Use of the comments section, page 5 of the meteorological logbook, should be encouraged as an aid to monitoring users' reactions to Office products. Further discussions would be held with the Office Communications Branch in response to comments from ships about facsimile reception quality and size of facsimile charts from GFE Bracknell. Port Met. Officers were asked to encourage observers to maintain and if possible improve the quantity and quality of wave reports, as many ships seemed often to omit the wave groups from weather messages. The Marine Superintendent confirmed that he wished foreign flag ships to be encouraged to become observers. To assist non-English speakers in completing United Kingdom meteorological logbooks, appropriate code books would be obtained from foreign meteorological services.

The use of anemometers should be actively discouraged in favour of the preferred method of estimating wind force by sea state. If anemometers are used, details of height and location should be provided. In requesting Port Met. Officers to draw shipmasters' attention to the existence of the Met. office ship routeing service, METROUTE, the Chairman asked for feedback on the proposal for an intermediate, or alternative, service which would provide information on the main storm centres worldwide by way of a data bank which could be accessed by satellite communications links as required.

Information about ongoing projects and services was given at the conference. The Operational World Weather Watch Systems Evaluation — North Atlantic (OWSE-NA) had commenced as a 2-year project to monitor and evaluate North Atlantic observing systems, including upper-air soundings, from all sources, to determine which provides the best quality and value. Any system should be user-friendly and in this context the Meteorological Observing System for Ships (MOSS) was proving popular and encouraging the regular entry and transmission of observations at all synoptic hours, particularly the all-important midnight and 0600 GMT data. Another forthcoming programme will be concerned with the monitoring of the quality of VOF observations from a small

band of Selected Ships with the intention of applying instrument exposure corrections. The purpose of the Voluntary Ship Observing Programme (VSOP) is to improve the quality of data collected by shipboard observers through additional guidance as to method of observing the weather.

The attendance of the European Port Met. Officers for the first time was to be welcomed and hope was expressed that they would be able to attend future conferences, their co-operation in servicing United Kingdom VOF ships being fully acknowledged. Dr Edward De Dycker, a Deputy Director in the Royal Belgian Meteorological Institute, Brussels, was attending in place of the now defunct post of Port Met. Officer, Antwerp, and announced with regret that certain marine meteorological services in his country were to be suspended on the grounds of the costs incurred. Funds for the transmission of observations from the 66 Belgian voluntary observing ships would be withdrawn. Conference expressed dismay at this action and hoped that every effort would be made to persuade the Belgian authorities to reconsider this retrograde step. The loss of the Port Met. Officer at Antwerp was of particular significance at a time when Antwerp appeared to be rivalling Rotterdam as the largest port in terms of shipping tonnage handled in northern Europe. Additionally, valuable ship data will be lost as a result of the withdrawal of the Belgian ships; the total number of ships co-operating with the World Meteorological Organization Voluntary Observing Ship scheme had already declined in the past year and this would be a further setback to plans to achieve an increase.

The conference closed with a vote of thanks for all Port Met. Officers, both at home ports and abroad, for their continued support in encouraging ships to undertake voluntary weather observing, and with hopes that all would be able to attend the next conference planned for 1989.

All the visitors also enjoyed a programme of talks by senior Met. Office staff and conducted tours of the more interesting and educational parts of the Office and of the Experimental Site for instrument design, development and testing at Beaufort Park near Bracknell.

PRESENTATION OF BAROGRAPH

Captain F.R.N. Best was invited to the Meteorological Office on 12 August 1987 to receive his inscribed barograph in recognition of his long service in observing ships. As reported in the October 1987 edition, he had been unable to attend the main presentation made by the Director General in April, due to being away at sea in his command, m.v. *Stena Oceanica.*

Captain Best, who first sent in a meteorological logbook from the Head Line of Dublin ship *Roonagh Head* in 1953, was presented with his barograph by the Marine Superintendent, Captain G.V. Mackie, at the Eastern Road office of the Marine Division in Bracknell. After being shown his early logs, Captain Best, accompanied by his wife, was entertained to lunch and later shown around the Archives at Eastern Road. (See photograph opposite page 9.)

AURORA NOTES JANUARY TO MARCH 1987

By R.J. Livesey
(Director of the Aurora Section, British Astronomical Association)

In Table 1 are shown the auroral observations received from ships during the period under review. In Table 2 are given a selection of the more active aurorae, seen by at least two observers on any given occasion. The effect of the reduction in the number of ships reporting from higher latitudes in periods of low auroral activity is quite marked when activity over the years is compared with the current observational output from land stations in Caithness, Orkney, Shetland and Finland.

Table 1 — Marine Aurora Observations January to March 1987

Date	Ship	Geographic Position	Time (GMT)	Forms in Sequence
1/2 Jan.	*Cumulus*	56° 50′N, 18° 07′W	2145	N
28/27	*Cumulus*	57° 00′N, 20° 00′W	0445	N
28/29	*Jura*	59° 19′N, 07° 16′W	0001–0030	G, HA, RA, G
20/21 Feb.	*Cumulus*	57° 00′N, 20° 00′W	0240	qN
20/21	*Botany Bay*	40° 53′S, 165° 44′E	0930–0948	G, RB+ orange glow
5/6 Mar.	*Cumulus*	57° 00′N, 20° 00′W	0240	qG
6/7	*Cumulus*	57° 00′N, 20° 00′W	0345–0515	qN, qm_3HB, qm_3HB
21/22	*Cumulus*	56° 56′N, 19° 18′W	2345	aRB
22/23	*Cumulus*	56° 48′N, 19° 46′W	2245	qHB
24/25	*Cumulus*	57° 13′N, 19° 32′W	2135–0040	qN
26/27	*Cumulus*	56° 47′N, 20° 07′W	0440	qN

KEY: a = active, m = multiple, (3 forms), q = quiet, G = glow, HA = homogeneous arc, HB = homogeneous band, N = aurora of unspecified form, RA = rayed arc, RB = rayed band.

Following upon the minimum of the last sunspot cycle, which is calculated to have taken place in August 1986, there has not been much auroral activity in the period concerned. Indeed, the magnetic field disturbances have been the most quiet for some years. In the North Atlantic area, most of the aurorae have been seen northwards from geomagnetic latitude 61 degrees north, although the Finnish land observers do tend to find that the aurora comes further to the south over their country.

The most widely-reported event was on the night of 20/21 February, which coincided with the largest magnetic disturbance of the period. The Finns reported rays and rayed bands, while quiet glows and arcs were seen from Caithness northwards by the various airport meteorologists, and by observers on o.w.s. *Cumulus*. At Kirkwall Met. Office, Mr M. Scollay reported a rayed arc, and this was typical of the activity seen during the period.

We are very pleased to receive reports from ships in the Southern Hemisphere because there are few land masses in the area which can sustain auroral observers anywhere near to the zone of the Aurora Australis. Recently, the Royal New Zealand Astronomical Society reformed its Aurora Section, collecting data principally from amateur observers in South Island, and meteorologists on Campbell Island. On the event of 20/21 February, m.v. *Botany Bay*, as will be

seen from Table 2, reported glows and a rayed band accompanied by an orange light. The timing coincided nicely with the aurora reported mainly from the Northern Hemisphere.

Table 2 — Auroral Activity reported January to March 1987 (from two or more observers in the Northern Hemisphere).

Date (Night)	Location and Number of Observers	Geomagnetic Latitude Lowest	Highest	at Storm Peak	Maximum Storm Activity Code*	Time (GMT)
4/5 Jan.	Finland (2)	60	60	60	2	1950–2150
6/7	Finland, Alberta (2)	61	64	64	3	1600–0500
21/22	Finland (2)	59	60	59	5	2030–2145
22/23	Finland (3)	59	60	59	4	1750–2245
23/24	Orkney, Alberta (2)	61	64	64	5	0200–0700
28/29	Finland, Atlantic (2)	59	63	63	3	2320–0200
31 Jan./1 Feb.	Finland (2)	60	62	60	5	2030–2115
7/8	Finland, Alberta (2)	60	64	60	5	0300–0410
8/9	Finland (3)	59	60	59	4	1738–1955
17/18	Finland (2)	60	60	60	2	1730–2205
20/21	Finland, Orkney, 'Lima' (6)	60	63	61	5	1800–0240
22/23	Finland, Orkney (2)	60	61	60	5	1830–2300
23/24	Finland (4)	60	61	61	5	1700–2000
27/28	Finland (4)	60	62	60	5	1835–2030
28/29	Finland (3)	60	61	61	5	1800–2300
1/2 Mar.	Finland (2)	60	60	60	5	1910–2100
3/4	Finland (2)	61	62	61	4	1840–2050
4/5	Orkney, Finland (2)	61	62	62	3	2105–0250
6/7	Finland, 'Lima' (3)	61	63	61	2	1925–0515
11/12	Finland, Alberta (2)	60	64	60	1	1710–0530
21/22	Orkney, 'Lima' (3)	61	63	63	3	2040–2340
22/23	Orkney, 'Lima' (2)	61	63	63	2	2130–2245
26/27	'Lima', Alberta (2)	63	64	64	5	0440–0530

*Storm Activity Code: 1 = Glow or patch, 2 = Homogeneous arc or band, 3 = Rayed arc or band, 4 = Ray bundles, 5 = Active moving or flaming storm, 6 = Coronal or half-sky, 7 = All-sky storm.

Although not an auroral phenomenon, the zodiacal light comes into the repetoire of amateur aurora observers. We were glad to receive a report on a sighting of the light from m.v. *Wellington Star* on 18 March at 01° 50'N, 166° 40'W, between 1900 GMT and 2100 GMT. The cone of light stretched vertically upwards, as bright as the Milky Way, and with the star Aldebaran on the axis of the cone at an altitude of 15 degrees.

The zodiacal light is best seen in the tropics against a dark, moonless night, away from the lights of civilisation, after sunset or before dawn. In extremely favourable conditions, a faint band of light may be traced from the top of the cone, around the sky to the anti-solar point, where a patch of light called the gegenschein may be found. The zodiacal light is caused by the scattering of sunlight by dust particles which form an outer atmosphere to the sun. The fact that the gegenschein exists would suggest that the Earth is embedded within this cloud of material. There is evidence to suggest that the brightness of the zodiacal light waxes and wanes with the sunspot cycle. It has been observed that peak light is obtained one or two years before sunspot minimum. This is the time when the sun's polar coronal holes are at their most active, sending streams of particles towards the Earth that cause the 27-day repetitive auroral and magnetic storms which tend to last for several days on each rotation of the sun. It would seem as if the zodiacal light is affected by solar activity as is the Earth's magnetic field. In this context, it is worth mentioning that the work of certain astronomers would suggest that the brightness of the moon's surface during a lunar eclipse also tends to rise and fall with the solar cycle, so that the part of the eclipsed lunar surface within the Earth's shadow appears brighter just before sunspot minimum than just after it.

Many observers have commented upon the cloudiness of the period, and O.W.S. *Cumulus* reported a tendency for cloud to form at night, a phenomenon familiar to Scottish land observers. The number of 'No auroral sightings' reports was markedly higher, but this was due in part not to the weather, but to a real fall in activity, as demonstrated by the magnetic record and by certain key land observers.

Dr Alastair Simmons, an experienced photographer of the aurora, observing from north of Glasgow, saw no visible aurora within the period. However, he operates cameras which are fitted with special interference filters with which to record the specific wavelengths at which the aurora is emitting light. These give the clue to the physical processes, energy values and probable heights at which the aurora is active. On processing some film for 16/17 February, although nothing could be seen by the naked eye, the camera had detected high-level auroral red emissions of the stable red arc (SAR). This is a diffuse aurora taking place at some 300 kilometres or more, above the surface of the Earth, and caused by low-energy electrons interacting with atoms of oxygen.

The SAR, formally called the mantle, or the mid-latitude aurora, occurs in mid-latitudes, with an east-west extension of thousands of kilometres. It lies some 300–700 kilometres above the Earth's surface, and its frequency of occurrence is related to the sunspot cycle. The intensity of light is related to the degree of magnetic disturbance, and it is associated with visible, discrete auroral activity polewards of its position. There is evidence to suggest that Korean court astronomers in the period 1507–1747 may have observed numbers of bright SAR events when the wanderings of the north magnetic pole positioned the SAR favourably over that country. The present-day positions of the auroral and SAR zones are shown in Figure 1. Under favourable conditions of dark sky and auroral storm activity, the SAR may be seen by ships at sea.

The SAR is not to be confused with the airglow. Auroral activity is caused by particles incoming from outer space, while airglow derives its energy from the absorption by atmospheric particles, of solar ultra-violet and X-ray radiation which is stored and then emitted as discrete wavelengths of light. The day airglow

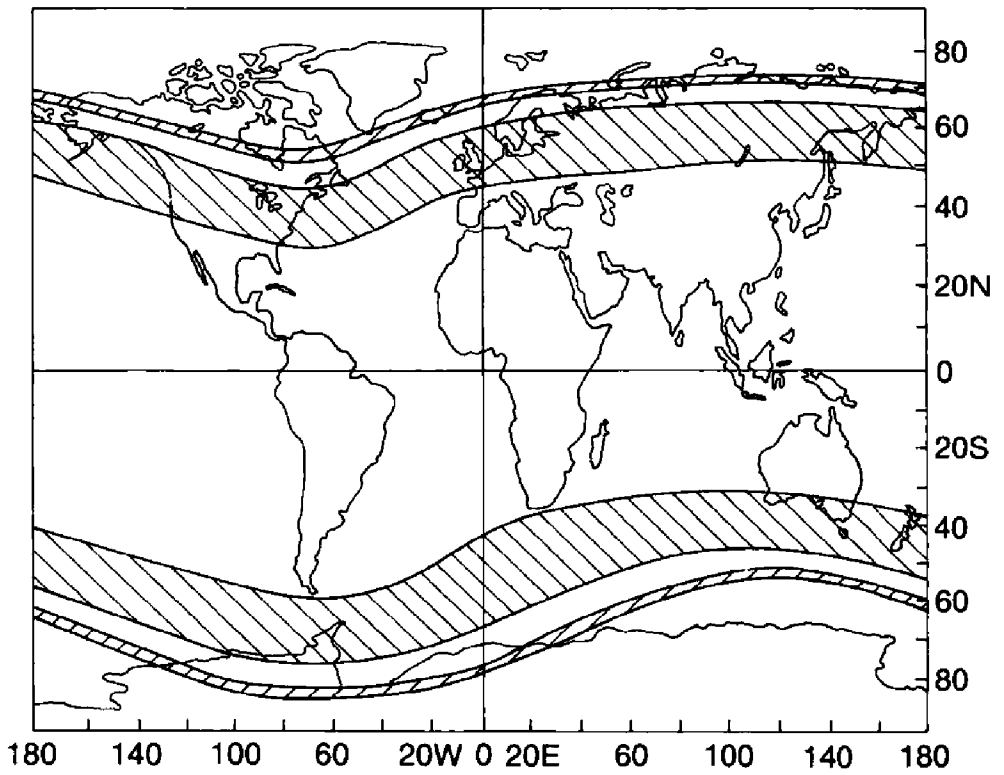

Figure 1. KEY: Auroral zones. Stable auroral red zones.

(only detected by instruments), the twilight and the night airglows have different characteristics depending upon the constituents of the atmosphere that are reacting. Nevertheless, some of the light emissions have similar colour constitutents to those of the aurora. The total emission of light can be more than that of visible, discrete aurora, but because it is spread out over the whole sky it may not be visible to the naked eye. However, on occasions, during dark nights at sea, it may be possible to see the sky showing some luminescence. Good sailing.

From *The Marine Observer* 40 years Ago

Wherever you may be, afloat or ashore — and this magazine reaches all the four corners of the world — may you have health and happiness throughout 1948. Unfortunately, we cannot look back on 1947 with much satisfaction; world food shortages, economic difficulties, international distrust, even the weather seems to have conspired against us — let us hope that 1948 will give the world a chance to return to sanity and to real international co-operation for the good of us all.

The difficulty of providing enough food for the people seems to be the chief preoccupation of everybody at present; we all hoped that the end of the war would see the finish of rationing, but the world still has to pay a large part of the price for world war and now it is up to all of us to pull ourselves out of the mess and see to it that we do produce enough. In particular the farmer, the seaman and the scientist together, have a greater role to play than they have ever had before.

The part that meteorology plays in this drama is very great indeed, for unfavourable weather can dely the tilling of the land, impoverish or ruin the crops, kill livestock, disorganise inland transport and seriously delay or wreck shipping. It is true that we humans can do little to change or direct the weather, for a greater Power than us has charge of this, but by a scientific study of the weather and the atmosphere in general and its effects on crops and crop production, we can at least plan wisely and prepare for eventualities, and here the scientist, the seaman and the amateur meteorologist can all play their part in assisting the farmer to produce the steak and the bread and the cheese and the beer which we all so naturally desire. The seaman thus plays a dual role — he carries the goods across the oceans and by observing and reporting the weather, he assists the scientists in forecasting and generally studying meteorological conditions for the benefit of the producer and of all concerned, including his brother seamen.

By the time this number is in print it is expected that all four of the British Ocean Weather Ships will be in service, and that the two Ocean "Stations" in the eastern Atlantic, which are allocated to Great Britain, will be constantly manned. The *Weather Observer* and *Weather Recorder* have already carried out successful patrols but, as might be expected, they have had "teething troubles" to contend with. The weather reports provided by these ships are already proving of value, and the usefulness of the ships to transoceanic aircraft is evident from the number of requests for bearings and other information received by radio from such aircraft in flight.

MARINE SUPERINTENDENT

Personalities

(Readers are invited to notify the Editor of observing officers retiring from the Navigating and Radio departments.)

RETIREMENT — CAPTAIN M.J. HERON retired on 17 December 1986 at the end of a distinguished career of 42 years in ships associated with the P. & O. Group.

Michael John Heron was born in December 1926 and attended St Peter's School, Bournemouth. He commenced his cadet training on H.M.S. *Worcester* in 1941 and in early 1944 was appointed to his first ship, s.s. *Empire Flag*, managed for the Ministry of War Transport by the New Zealand Shipping Company. He saw war service in the North Atlantic convoys as well as in the South Atlantic and Indian Oceans.

Having gained his Master's Certificate in 1953, Captain Heron was promoted to command the *Papanui* at the relatively young age of 30, in 1957, and remained with the New Zealand Shipping Company until transferring to Overseas Containers Ltd in January 1969. He served in the latter company until the time of his retirement at the age of 60, by which time it had become P. & O. Containers Ltd.

No less than in other aspects of his career, Captain Heron helped to provide a substantial amount of weather information, commencing with his first log from the *Pipiriki* in mid-1947. His record shows that he was involved in the

compilation of no less than 71 meteorological logbooks of which 46 were classed as Excellent. For his dedication to the cause of weather observing he received 11 Excellent Awards between 1964 and 1986, having also earned himself the Long-Service Award barograph as early as 1974.

On the occasion of our thanks and good wishes being sent to Captain Heron for his retirement, he said 'I was very fortunate to have joined O.C.L. at its inception and took the second vessel, *Flinders Bay*, into the Australian service. When I see what has happened to many of my erstwhile colleagues, I consider myself lucky to have thrown in my lot with O.C.L. and played a small part in the operation of one of the few recent successes in British shipping. Thank you for the excellent service the Met. Office has provided and for your good wishes.'

RETIREMENT — CAPTAIN I.D. GRIGOR has retired from the sea after a very varied career of 36 years.

Ian Dawson Grigor was born in September 1933 and educated at St Aloysius School, Newcastle. He became apprenticed to Chapman and Willan Ltd and sailed in his first ship, *Frumenton*, in April 1951; during the next ten years he served with a variety of companies, including Huntings, Anglo Danubian, Stag Line, Hall Line, James Fisher, Newbiggin Shipping and Coal and British & Continental. The latter 26 years were spent with Esso Petroleum Company Ltd.

Captain Grigor gained his Master's Certificate at Liverpool in July 1966 and was promoted Master of the *Esso Warwickshire* in April 1973. During his time with the Esso Company he provided a total of 38 meteorological logbooks, the first from *Esso Westminister*, received at the Met. Office in August 1966; there were 6 books classed as Excellent and he received Excellent Awards in 1974, 1978 and 1983.

Captain Grigor retired on 30 November 1986; he records that one of his most interesting voyages was on board *Firth Fisher* during the International Geophysical Year of 1957 when he spent a long period of time in the Hudson Bay and Baffin Island regions. He saw research being conducted into the varying layers of the ionosphere and experienced being ice-bound in the Hudson Strait for 8 days.

Our good wishes are extended to Captain Grigor who hopes to maintain contact with the sea in some form or another during his retirement, as opportunity dictates.

RETIREMENT — CAPTAIN G.V. SPONG retired officially on 1 June 1987 after more than 41 years with Houlder Brothers and Furness Withy Shipping.

Gordon Vincent Spong was born in March 1928 and educated at Raines Foundation School, London. Before joining his first ship, *Imperial Transport*, on 27 November 1945, he had been employed for the last months of the war as works chemist and radiologist. He obtained his Master's Certificate in October 1955 and on being promoted 8 years later he took command of m.v. *Oreosa*.

Voluntary observing for Captain Spong began in 1952 on the *Rippingham Grange*, and he helped to compile 43 meteorological logs in all, 3 of them of 'Excellent' standard. His command of his last few years at sea was *British Steel*, which he stood by in a supervisory position during building at Harland & Woolf, Belfast, and brought the ship out on her maiden voyage, at which time she was the largest bulk carrier to be built in Europe, 173,028 tonnes dwt.

Captain Spong had earlier sailed on the ill-fated *Royston Grange* (which was

later lost in the River Plate with all hands) whilst engaged in the chilled meat trade to Argentina and Uruguay. He also became engaged and married to an Argentine at that time, and we offer thanks and good health to him and his wife in retirement at their Eastbourne home.

RETIREMENT — CAPTAIN A.A. RUNDLE retired from Ocean Fleets on 30 January 1987 after serving 43½ years in conventional liners of Blue Funnel, Glen Line and Elder Dempster Lines, followed by time in bulk carriers, tankers and O.C.L. container ships, and his last three sea years on the large Ro/Ro container ships of the Barber Blue Sea Line's round-the-world service.

Alfred Austen Rundle was born in January 1927 and received his education at St Austell County School in Cornwall. He was indentured to Alfred Holt & Company in August 1943 to sail on his first ship, s.s. *Neleus*, and obtained his Master's Certificate in December 1952. His first command was *Astyanax* in July 1967. During World War II he earned the 1939/45, Atlantic and Burma Stars for service in North Atlantic convoys and with the eastern fleet based at Trincomalee.

Captain Rundle was involved with weather observing in 27 logbooks, the first being received at Bracknell in 1948 from the *Nestor*; 19 of these logs were assessed as Excellent for which dedication he was awarded books on eight occasions. It is pleasing to know that Bracknell's services have been appreciated at sea by an experienced Master, and we wish him well in retirement and good caravanning to pastures new from his home beside the River Fal in Cornwall.

Book Reviews

Deep-sea Challenge, edited by A.L. Rice. 180 mm × 245 mm, 336 pp., *illus.* UNESCO, 7 Place de Fontenoy, 75700 Paris. Price: £25.00/140 FF.

This book tells the story of the John Murray/*Mabahiss* Expedition to the Indian Ocean in 1933–34. The Anglo-Egyptian venture of scientific discovery on board the research vessel *Mabahiss* provides the basis for a unique account of an historic oceanographic expedition.

The book's production was the result of an approach to UNESCO in 1983 by the University of Alexandria, to celebrate the fiftieth anniversary of the expedition which had strong connections with the Egyptian scientific community. The ensuing collaboration also resulted in the organization of an international symposium held at the University of Alexandria in September 1983.

The majority of the editor's text is woven around the extended narrative provided by the expedition's leader, Lieutenant-Colonel R.B. Sewell, who had previously been unable to find a publisher. Sir John Murray, the sponsor, was perhaps best known for exploiting the phosphate resources of Christmas Island in the Indian Ocean in collaboration with the rival claimant to the island, George Clunies Ross of the Cocos Islands. It was the Christmas Island Phosphate Company which brought Sir John the wealth which enabled him to make the

bequest which financed the expedition almost 20 years after his death. His Egyptian Majesty's Ship *Mabahiss*, built by Swan Hunter and Wigham Richardson on Tyneside, was borrowed from the Egyptian Government for the expedition; the ship's name was the Arabic word for 'researches'.

This interesting book chronicles the 9-month oceanographic voyage from Alexandria via the Suez Canal, through the Red Sea, the Gulf of Aden, the north-western Indian Ocean and the Gulf of Oman. The narrative involves the reader in the day-to-day running of the expedition, mainly through Seymour Sewell's lively and enthusiastic account of the successes and failures and of the human and technical problems that the team encountered.

The first chapter supplies historical background, including a short biography of Sir John Murray, his bequest which enabled the expedition to take place, and its organization. This is followed by Lieutenent-Colonel Sewell's excellent record of the expedition itself, edited by Mr Rice, whilst the *Mabahiss* was under the command of Captain K.N. MacKenzie, a former Radio Officer and AB, who had previous experience in oceanographic research. The large quantity of equipment shipped out from England was loaded at Alexandria and finally at Port Said from whence the ship sailed in September 1933. The P. & O. Company acted as agents throughout the expedition, making all the necessary arrangements in the ports of call which included Perim Island, Aden, Kuria Muria Islands, Karachi, Muscat, Bombay, Mombasa, Zanzibar, Seychelles, Maldive Islands and Colombo. Sewell's account details the trials and endless problems that beset the officers and crew, their oceanographical equipment giving frequent trouble but more often than not put to rights. Many of the marine specimens captured are well described and sketched, and there are a number of black and white photographs of the crew in action, taken by Assistant Chemist H.C. Gilson, who was later to become Director of the Freshwater Biological Association.

The extensive biographical notes include a section on the four Egyptian officers who had the unique attribute of having been trained on HMS. *Worcester* at Greenhithe in the 1920s, and information is thus given on the Thames Nautical Training College. Out of a total complement of forty, three more than the ship's intended capacity, the 24 Egyptians were recruited from their country's Coast-guard Service. Then follow historical notes about the ship herself, the significance of the expedition and references used, as well as a catalogue of the John Murray Expedition Scientific Reports and a comprehensive index.

Although at first sight this book appeared to be dry and dusty fare for a simple mariner, on delving deeper it soon became a fascinating work which would seem to appeal to a very wide spectrum of readers, especially those with an interest in the development of oceanography, but doubtless also to anyone who has visited the ports and seas covered during this expedition.

The Royal Navy and the Falklands War by David Brown. 235 mm × 195 mm, 384 pp., *illus*. Leo Cooper Ltd, Heinemann Group of Publishers, 10 Upper Grosvenor Street, London W1X 9PA. Price: £16.95.

There are many published accounts of the roles played by the Army and the Royal Marines in the 12-week war of 1982 and this work is therefore an important addition to the literature on the conflict, being the only complete narrative of the naval side of the Falklands campaign. It is also reassuring that a

book of such significance has been manifestly researched and written with meticulous care by an author patently qualified to do so. David Brown served in the Royal Navy for 12 years before joining the Ministry of Defence's Naval History Branch, of which he became the head in 1977. He had already written a number of naval books before he was approached by the Vice Chief of Naval Staff in 1982 about recording the naval history of the war for the Falkland Islands.

The prologue provides the background to previous battles in the region, covering as it does the first battle of the Falklands in 1914, proving that history does repeat itself. The six parts of the book are divided into 21 chapters and the whole is a suitable tribute to all those who took part in and contributed to the success of Operation 'Corporate', in particular those of the naval services. The role of all the Merchant Navy STUFT (Ships Taken up from Trade) ships is extensively covered, including most of one chapter devoted to the fateful loss of the *Atlantic Conveyor*. Full details of all the actions are graphically described, all ships' statistics given in the four appendices and a comprehensive index provided.

More than 100 photographs, both in black and white and colour, afford an opportunity for the reader to appreciate fully some hitherto unclear aspects of the conflict, as many of the illustrations may not have been published before.

As the author says in his introduction, one area of operations has had to be omitted; for reasons which all will know, the doings of the submarines must remain discreetly unreported for the time being and it must suffice to say that all those who served in the South Atlantic are in the debt of the men of the six submarines which provided the advanced guard and then the first line of defence against the Argentinian Navy.

The various maps placed at the front of the book evoke memories of the war from names such as Mount Tumbledown, Sapper Hill, Goose Green and San Carlos Water, before even the lucid text is read. It is also wise to study the glossary in some detail before starting on the chapters as the numerous specialized expressions and acronyms can prove confusing.

This impressive work is bound to become a major source of reference and of interesting facts in the naval field of the Falklands conflict.

J.F.T.H.

Notices to Marine Observers

PHOTOGRAPHS PUBLISHED IN *THE MARINE OBSERVER*

The Editor extends sincere thanks to all those members of ships' staff, their wives and passengers for the many fine photographs, negatives and transparencies they have sent in with meteorological logbooks or independently. Many of these have been published in *The Marine Observer* but owing to limitations of space some good compositions have inevitably been omitted. These are not wasted, however, as they are sent to appropriate co-operating scientists and experts whenever

possible, and often contribute to their knowledge of the creatures and the moods of the weather experienced over the sea. The experts' appreciative responses to ships' reports speak for themselves.

Prints and slides can be returned to contributors if they wish and maximum use of photographs can be made when they are accompanied by details of date, GMT, position and a report of the sighting, as well as sketches if possible.

To help us maintain the standard of photographs published, observers are requested to send us their marine efforts and we will make use of them whenever practicable.

A COMPETITION FOR NAVIGATORS 1988

The Royal Institute of Navigation is offering many splendid prizes that could be won by competitors aged from 8 to 23 in their Annual Competition in 1988. All they have to do is to write about getting from one place to another — for that is what navigation is all about.

In the past, competitors have written about sailing, orienteering, walking, exploring, pot-holing and flying. Several described how animals navigate and one wrote a software programme for a jet aircraft. The judges take age and opportunity fully into account. Individuals or groups may enter.

Prizes include a trip at sea with the Royal Navy, a flight in a jet aircraft, gliding with the Royal Air Force, crossing Europe on the flight deck of a British Airways jet liner, a voyage at sea in a merchant ship or a square-rigger and compasses, clocks, binoculars and books.

The closing date for entries is 1 October 1988 and the prize-giving will be in London in early January 1989. It will include illustrated talks by navigation experts and tea. For further details and an entry form apply to the Royal Institute of Navigation, at The Royal Geographical Society, 1 Kensington Gore, London SW7 2AT, telephone 01 589 5021.

Fleet Lists

GREAT BRITAIN

Amendments to the list published in the July 1987 edition of *The Marine Observer*. Information regarding these corrections is required by 30 September each year. Information for the July lists is required by 31 March each year.

Name of Vessel	Date of Recruitment	Master	Observing Officers	Senior Radio Officer	Owner/Manager
Arctic Universal	12.8.87	P. Ramsden	D.Neaves, A. Ross, R. Thompson	H. Tait	Gateway Shipping Ltd
Baltic Universal	26.3.87	W. Milne	R.A. Thomson, A. Barratta, S. O'Mahoney	M. Bailey	Gateway Shipping Ltd
Birchwood	16.9.87	A.P. Hill	M. King, D. Day		Buries Markes (Ship Management) Ltd
Dart America	16.6.87	C.A. Laurence	T.A. Meharry, R.A. Daya, J. White	R. Somers	Furness Withy (Shipping) Ltd
Fort Kipp	27.8.87	R.B. Jones	P. Chan, P. Radcliffe, C.M. Goddard	J.B. Worthington	Canadian Pacific Steamships Ltd
Garrison Point	4.6.87	L.G. Relton	D. McLaren, R.A. McNab, C.D.G. Grahame	M.C. Hill	Hudson Steamship Co. Ltd
Graigwerdd	24.6.87				Idwal Williams & Co. Ltd
Ironbridge	25.3.87	N. Matthews	M. Carter, R. Ellis, D. Bowman	J. Miller	Furness Withy (Shipping) Ltd
Lancella	15.9.87	J.W. Kultschar	E. Casson, W. Wilson	J.G. Legge	J. Marr & Son Ltd
Lerma	14.5.87	L.R. Staines	D. Rendon, J. Andrews, C. Everett	M. Brewer	Cardiff Ship Mgmt & Services Ltd
Lord Nelson	24.8.87	H. Munro	D. Neal, J. Clay, J. Green		Jubilee Sailing Trust Ltd
Maersk Cadet	7.4.87	P. Dew	C. Durman, D. Price, R. Deyes	D. Gavin	Britship (I.O.M.) Ltd
Norrisia	24.6.87	D. Davidson	J. Urquhart, S. Little, I. Falconer, J. Cornwall	J. Mercer	Shell Tankers (U.K.) Ltd
Norsea	7.4.87	D. Ellerby	–. Silverwood	B. Loverley	North Sea Ferries Ltd
Northern Horizon	19.4.87	P. Taylor	P. Garner, A. Fuller		J. Marr & Son Ltd
Northern Venture	2.6.87	D. Brown	M. Drewey, D. Mills, –. Tunstall	R. Hodge	Stena Offshore Ltd
R.A. Emmerson	24.8.87	J. Simcox	S.J. Hutty, J. McCaskie, G. Begley	A. Bell	Canadian Pacific Steamships Ltd
Rimula	24.6.87				Shell Tankers (U.K.) Ltd
St Clair	5.8.87	D.G. Gray	J. Duncan, G. Grove	R. Nummey	POETS Fleets Mgmt Ltd
Santos Star	30.8.87	C. Burfton	A. Lee, R. Fitton, P. Buckley	I. Petrie	Blue Star Ship Mgmt Ltd
Stolt Surf	13.4.87				Stolt Nielsen Inc.

Venassa	−.3.87				Shell Tankers (U.K.) Ltd
Westfield	28.9.87	G. Clifford	P. Karunasundera, M. Bingham, R. Brough	B.C. Vantwest	Buries Markes (Ship Management) Ltd
Young Endeavour	23.6.87	C. Blake	A. Shelverton	L. Scullion	British Australia Bicentenial Trust

The following Selected Ships have been deleted:

Arapaho, Arctic Corsair, Carina, Centaurus, Coastal Pioneer, Dacebank, E. W. Beatty, Firmnes, Ionic Ferry, Limari, Marsman, Merchant Patriot, Pikebank, Reynolds, Roachbank, Serenia, Sir Walter Raleigh, Summity, Tectus, Tenchbank, Troutbank, Tula.

BRITISH COMMONWEALTH

AUSTRALIA (Information dated 15.9.87)

The following Selected and Supplementary ships have been recruited since the list published in the July 1987 edition of this journal:

Australian Spirit, Canopus, Energy Searcher, Flamingo Bay, Iron Sturt, Iron Whyalla, Island Gas, Jabiru Venture, Klang Reefer, Koolinda, Kowulka, Lindesay Clark, Mawashi Al-Gassem, Melbourne Trader, Mobil Flinders, United Spirit.

The following ships have been deleted:

B.P. Endeavour, Eastern Enterprise, Icebird, Iron Somersby, Prospector II, Xiang Yang Hong 5.

Corrections

The following ships have Supplementary status:

Iron Carpentaria, Iron Curtis, Iron Kembla, Iron Monarch, Iron Newcastle, Iron Pacific, Iron Prince, Iron Shortland, Iron Spencer.

NEW ZEALAND (Information dated 1.8.87)

The following Selected and Supplementary ships have been recruited since the list published in the July 1987 edition of this journal:

Amaltal Explorer, Bounty IV, Capitaine Tasman III, Forum New Zealand II, Spirit of Freedom.

The following Selected and Supplementary ships have been deleted:

Bounty III, Capitaine Cook III, Kolle D., New Zealand Trader, Ngahere, Tiare Moana, Ile de Lumiere III.

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